CHAPTER 4

NATURAL RESOURCES MANAGEMENT

This chapter presents an overview of natural resources management for MCB and MCAS Camp Pendleton. Base natural resources management consists of a suite of conservation and management programs, each with program specific goals, objectives, and planned actions. These policies, goals, objectives, and planned actions were developed and prioritized to achieve Camp Pendleton's overarching natural resource management goals, incorporate the principles of ecosystem management in all programs, and support the military operational and support requirements of the Base.

The natural resources management programs are organized into general categories (many of which are further sub-divided), including: (1) ecosystem management; (2) natural resources inventory; (3) wetlands, estuary/coastal, and riparian management; (4) wildlife management; (5) threatened and endangered species management; (6) exotic invasive species control; (7) watershed management; (8) grounds maintenance and landscaping; (9) grazing and agricultural outleases; (10) fire management; (11) environmental planning; and (12) information management. Natural resource related recreation and education programs are presented within Chapter 5. Under each objective within the natural resources management program are a series of planned actions. Where planned actions support more than one management program objective they are repeated under different subsections within this chapter and Chapter 5.

Also presented within this chapter are the mechanisms and processes in place for the implementation, oversight, integration, and enforcement of natural resources management programs and planned actions. These mechanisms and processes are key to the success of natural resources management and to the long term capability of Base lands to support the military mission.

4.0 NATURAL RESOURCES MANAGEMENT OVERVIEW

The Sikes Act defines the purpose of natural resources management on military lands as 'the conservation and rehabilitation of natural resources on military installations; the sustainable multipurpose use of the resources, which shall include hunting, fishing, trapping, and nonconsumptive uses; and, subject to safety requirements and military security, public access to military installations to facilitate the use [of these resources].' Camp Pendleton has long recognized the value of its resources and has continued to invest in their conservation and management over the years. Camp Pendleton's history of practicing responsible stewardship while accommodating multiple land uses dates back as far as the mid-1950s and early 1960s, beginning with a cooperative agreement with state fish and game biologists to establish a Base hunting and fishing program. Since then, the nation's growing awareness of issues concerning pollution, habitat loss, and land degradation has resulted in an increase in environmental protection legislation (e.g., Migratory Bird Treaty Act [1918], Sikes Act [1960], NEPA [1969], Clean Air Act [1970], the ESA [1973, as amended], CWA [1977],

etc.). Camp Pendleton has likewise increased its investment in regulatory compliance and stewardship as is exhibited by the addition of staff devoted to natural resources management and the myriad of programs and projects the Base has funded and performed over the years.

By virtue of its vast amount of open space and its compliance and stewardship initiatives, Camp Pendleton has contributed substantially to regional biodiversity conservation and planning efforts. In doing this, the Base has also been able to maintain a degree of flexibility in the implementation of the military mission and natural resources management. This approach takes a long term view of human activities, integrating military uses and requirements with the conservation and management of biological resources.

4.0.1 Philosophy, Guiding Principles, and General Approach

Camp Pendleton's natural resource management philosophy is that management programs should achieve the objectives of regulatory requirements and foster stewardship of the resources entrusted to Marine Corps while not constraining the ability to accomplish established and future military training requirements. Camp Pendleton's intent is to preclude long term damage and degradation to training lands by managing natural resources through processes and programs in accordance with the following guiding principles:

- Sustain and restore ecosystem dynamics, such that the native plant and animal communities on Base are sufficiently resilient to withstand an expanded array of disturbances and incursions occasioned by military mission requirements on Camp Pendleton;

- Manage native vegetation to promote optimal community succession for ecosystem integrity with a focus on sensitive species. Native plant communities should be maintained by natural processes and not be artificially manipulated, except as needed to restore depleted natural resources, or where areas are isolated from natural dynamics of the ecosystem;

- Enhance the value of ecosystems by eradicating exotic plant species, promoting native plant communities, preventing new weed introduction and restoring areas to their original conditions after disturbance;

- Minimize occurrence of wildfires caused by Base activities through the Fire Danger Rating system and controlled/prescribed burns in coordination with adjacent land managers;

- Achieve greater biological diversity and distribution of native species, especially federal threatened and endangered species populations, throughout the region/ecosystem;

- Establish self-sustaining populations of listed species that require little human intervention for maintenance; and

- Develop effective partnerships among private and government agencies.

Although much of Camp Pendleton's current approach to natural resources management and stewardship involves maintaining compliance with applicable laws and regulations, which are inherently species and resource specific, several of the existing programs (e.g., erosion control, fire management, exotics control, listed species management) either directly or indirectly support an ecosystem management approach. To the extent that federally listed species are indicators of the health of habitats and ecosystems, listed species protection programs are used by the Base to provide umbrella coverage for other, non-listed native species and habitats. Camp Pendleton's Riparian and Beach/Estuarine Conservation Plans (USFWS 1995a) exemplify this umbrella coverage in their approach to threatened and endangered species management. Although the impetus for the Riparian and Beach/Estuarine Conservation Plans was for the protection of federally listed species, the effect of the plans has been to improve riparian and beach/estuarine habitats for all ecosystem users, including other native species and human users of the Base.

Camp Pendleton's ongoing natural resource conservation and management involves:

- The avoidance and minimization of adverse effects to federally listed species and sensitive resources through the implementation of programmatic instructions (published rules and guidelines for land users on Base)" and the NEPA process for evaluation of potential impacts of new activities and projects;

- Native habitat maintenance and enhancement through the implementation of the programmatic conservation plans, fire management, exotics control, erosion control, pollution prevention, water quality management, etc.; and

- Monitoring and surveying to understand and track the Base's inventory of species and habitats and using this data to evaluate the status, quality, distribution, and trends of those resources and management plans.

The Base's natural resources conservation and management programs will continue to be directed toward achieving the overarching natural resource management goals identified within Section 1.4.2 of this INRMP. To ensure that individual programs at Camp Pendleton are working towards in an ecosystem approach, Camp Pendleton is using the ongoing INRMP process to develop a vision of desired future conditions that integrates ecological, socioeconomic, and institutional perspectives. This vision will incorporate a regional perspective and be developed in collaboration with appropriate regional land use, management, and planning agencies.

An important aspect to Camp Pendleton's natural resources management is the establishment of cooperative relationships with state and federal fish and wildlife agencies. While the Base is required to consult with federal agencies to ensure compliance with legal requirements, Camp Pendleton also recognizes and values the professional expertise and experience of federal and state fish and wildlife agency personnel for other than compliance related issues.

Cooperative relationships are becoming increasingly important as Camp Pendleton and the region continues to evolve towards an ecosystem based approach to management.

Ultimately, the success of Camp Pendleton's natural resources management is reflected in the long term sustainability of species populations and ecosystem functions, the maintenance of regulatory compliance, and in the continued ability of Camp Pendleton to support the military mission. Over time, many factors upon which this INRMP is based are likely to change, including military mission requirements, the federal list of threatened and endangered species, knowledge of the ecology and requirements of the listed species, as well as an understanding of the nature of anthropogenic impacts to those species. The integration and implementation of the Base's natural resources management and this INRMP will follow an adaptive management approach that acknowledges uncertainty, monitors the various components of the INRMP, and learns from experience with the end goal of improving future management actions. Adaptive management can be described as a system for attaining "resilience in the face of surprise" (Lee 1993). Ultimately, the success of this INRMP depends upon both its ability to conserve natural resources through time and its ability to accommodate the Base's present and future mission requirements. Simply stated, success depends upon adaptation.

4.0.1.1 PROGRAM GOALS AND OBJECTIVES

In addition to the three overarching natural resources management goals presented within Section 1.4.2, each natural resources management program (e.g., erosion control, fire management, exotics control, listed species management) has individual goals and objectives. The intent of the program specific goals is to be visionary, ideal, and general in character and to provide long term guidance in defining the direction and purpose of the program. Objectives within each program represent shorter-term benchmarks to help meet program specific goals. Due to the breadth of management programs and planned actions within this INRMP, the objectives are generally not quantitative. Nonetheless, they are important in establishing the conditions that must be met to achieve program specific goals.

4.0.1.2 PLANNED ACTIONS, TIMELINES, AND FUNDING

The planned actions presented within the management programs in this chapter (and Chapter 5) represent the ongoing and anticipated actions that the Base has developed to ensure compliance with regulatory requirements, to facilitate implementation of protocols and procedures, to help meet natural resources management goals and objectives, and to address specific issues or needs. Planned actions contribute to the accomplishment of one or more management program objectives. Where a planned action supports more than one management program objective it is repeated under each appropriate objective throughout this chapter and Chapter 5. To aid the reader, planned actions have been cross-referenced when they apply to more than one program objective within the document.

Planned actions are classified as either Priority Planned Actions or Other Planned Actions. Priority Planned Actions are those projects and actions that Camp Pendleton has committed

to accomplishing and/or are required by laws, regulations, or other agreement. Other Planned Actions are those projects and actions that Camp Pendleton desires to accomplish, but cannot commit to undertaking due to restrictions and limitations on fiscal and personnel resources. Priority Planned Actions presented in this chapter were developed in consideration of DoD and Marine Corps policies and directives to: (1) achieve Camp Pendleton's natural resource management goals, (2) incorporate the principles of ecosystem management, and (3) support the military operational requirements of the Base. Camp Pendleton is committed to implementing each Priority Planned Actions by the end of the calendar year noted after the action. Actions identified as "ongoing" are carried out each year or as required.

Other Planned Actions represent desired, but not essential, actions that will further support the military mission, enhance the integration of natural resources management, or support stewardship of resources entrusted to the Marine Corps. Within each natural resources management program, Other Planned Actions are prioritized to assist in the determination of which action(s) is(are) to be accomplished first should funding/resources become available. The prioritization of Other Planned Actions is relative to the Other Planned Actions within that program. The same Other Planned Action can have different prioritization rankings if it occurs within more than one program (e.g., it may be a higher priority for the accomplishment of one program objective as compared with another objective). In no case does an Other Planned Action appear as a Priority Planned Action, or vice versa.

The prioritization of the Other Planned Actions is denoted in the following manner: one asterisk (*) after the planned action means that the action is of lesser priority within the program relative to the remaining Other Planned Actions in that program; two asterisks (**) indicate an Other Planned Action which has a moderate level of priority; and three asterisks (***) represents the highest level of priority for an Other Planned Action.

Development and tracking of planned actions provides a framework for evaluating timely progression of INRMP implementation. Where possible and desirable, the Base has tried to be specific in the language of the planned actions. It is not possible to be more specific with some planned action because they are still being developed or depend on results of other, earlier actions. It is also not desirable to be more specific with some planned actions to allow the flexibility necessary for adaptive management.

It is important to emphasize that all planned actions have one or more sponsoring agent within the Base. These sponsors are responsible for the planning, budgeting, implementation, and tracking of actions. Costs associated with the execution of Priority Planned Actions and Other Planned Actions required identification at the earliest practicable stage of a proposed action. The Base organization responsible for implementation of the action is responsible for budgeting for and funding the action.

4.0.1.3 FISH AND WILDLIFE INTER-AGENCY COORDINATION

Camp Pendleton has been, and continues to be, involved in coordinated management and partnering efforts with fish and wildlife agencies at both the state (California Department of Fish and Game) and federal (U.S. Fish and Wildlife Service) levels. Many of the components

of Camp Pendleton's Natural Resources Management Program that have been implemented over the last few decades were developed in coordination with the CDFG or USFWS, including the hunting and fishing programs and federally listed threatened and endangered species management.

Sikes Act provisions and cooperative agreements for outdoor recreation, such as hunting and fishing, are implemented nationally by a MOU between the DoD and DoI. Locally, Camp Pendleton has a draft Outdoor Recreation Plan, the completion of which is a planned action identified within this INRMP. The final Outdoor Recreation Plan is to be included in future revisions of this INRMP and, therefore, will be reviewed by state and federal wildlife agencies.

Although later superceded by the Riparian BO programmatic consultation (USFWS 1995a), the 1986 USFWS/Camp Pendleton MOU for management of endangered least Bell's vireos on the Santa Margarita River provided the first ecosystem based approach within the DoD covering more than 10,000 acres of sensitive riparian wetlands, coastal estuaries, beaches, and dune areas. It developed an agreement on, and framework for, species specific management of Camp Pendleton's contribution to the region's endangered least Bell's vireos population.

In addition to working with the USFWS on regulatory and management issues, Camp Pendleton has contracted staff from the Federal Projects Branch of the USFWS to conduct surveys, research, and monitoring on Base. Examples of these projects include southern steelhead trout (*Oncorhynchus mykiss*) habitat suitability survey (USFWS 1998f), Pacific pocket mouse monitoring (USFWS 1999c), snowy plover surveying (Collier & Terp 2000), upland habitat restoration and maintenance for federally listed species (in progress), survey of the status of wildlife watering devices (USFWS 2001f).

Camp Pendleton has also participated in quarterly partnering sessions with the Navy and USFWS. These sessions have generated partnering efforts such as dispute resolution, the development of a mutually agreed upon format for biological assessments, and an arroyo toad symposium (held at MCAS in October 2000).

4.0.2 Program Implementation: Oversight, Integration, Compliance, and Enforcement

While integration, implementation, and enforcement are a part of all the programs in this INRMP, this section highlights some of the initiatives geared specifically toward serving those functions. Included in this section are the (1) organizations and processes involved in oversight and integration; (2) use of programmatic instructions; (3) environmental inspection and compliance; and (4) enforcement mechanisms. Other initiatives and processes that are important to the implementation and integration of this INRMP can be found elsewhere in the document. For example, essential to INRMP implementation is the funding of programs (and planned actions), which is presented in Section 1.7. Moreover, no single initiative or process presented within this section is solely capable of ensuring successful integration,

implementation, or enforcement of natural resource programs, nor do any of these initiatives serve as a substitute for the established staff action process.

4.0.2.1 OVERSIGHT AND INTEGRATION

The lead organization on MCB Camp Pendleton for overseeing and coordinating environmental issues is the Assistant Chief of Staff, Environmental Security (see Figure 1-2, and Appendix H). Aboard the Air Station, the Environmental Officer provides the policy development, program oversight, data management, and regulatory liaison for natural and cultural resources. Although MCAS is under a separate command structure and has its own staff, Marine Corps Base and MCAS staffs regularly collaborate to ensure that management and planning efforts are coordinated between the installations.

Integration of the INRMP not only requires a coordination of efforts among the natural resources management programs and planned actions, but also an integration of land *management* with land *use* (training, maintenance, recreation, etc.). The integration and coordination of land management efforts is achieved, in part, through the evaluation and update of the INRMP itself. This review process, which is coordinated for the entire Base by the Planning Branch within the Resource Planning Division of AC/S ES, provides a venue for evaluation, discussions of adaptive management, presentation of ideas for improvement, and assessment of progress towards goals and objectives with Base staff and resource agencies. The INRMP review process not only helps assure that the management actions are achieved, but provides for an evaluation of the integration of, and consistency among, the planned actions. Areas that are identified as not well integrated will be appropriately addressed (e.g., some planned actions may be added to the INRMP as a result of this process).

Several mechanisms and processes help ensure the integration of land management with land use. These are described in other sections within the INRMP and include, but are not limited to, the use of programmatic instructions (Section 4.0.2.2); the NEPA process (Section 4.12); planning and project support (Section 4.12); environmental training, education, and awareness programs (Section 5.5); and information and Geographic Information Systems management (Section 4.14).

4.0.2.2 PROGRAMMATIC INSTRUCTIONS

Programmatic instructions (PIs) represent the published “general rules” which regulate and guide Base activities (e.g., military training, maintenance, construction, and outdoor recreation). By providing a programmatic operational framework for military and civilian users of the Base without the burden of unnecessary technical detail, PIs provide flexibility in concert with species/ecosystem conservation and help ensure avoidance and/or minimization of adverse impacts to federally listed species and other sensitive resources. Many PIs are applicable basewide and help minimize impacts to the environment in general (e.g., fire danger ratings); however, other PIs may be specific to actual locations of listed species (e.g.,

least Tern nesting sites) or to general areas of the Base (e.g., riparian habitat and range and training areas).

Camp Pendleton PIs also serve to provide the USFWS with a framework for issuance of terms and conditions within Biological Opinions. Programmatic instructions presented in Biological Assessments and terms and conditions within BOs are incorporated into appropriate implementing documents and Base directives.

As "general rules," programmatic instructions are disseminated by various methods including Base Orders, Base Bulletins, and as special conditions in documents approving recurring activities. Key methods for disseminating PIs are listed in the following paragraphs.

Base Orders

The Base Range and Training Regulations (BO P3500.1_) provide information, instructions, and procedures governing the use of ranges, training areas, and airspace operated and controlled by Camp Pendleton (see Appendix Q for excerpts from most current version of regulations, BO P3500.1K). Included in this order are specific programmatic instructions that address how units training on and over Camp Pendleton are to operate under given conditions. Conditions addressed include the various Fire Danger Ratings, basewide environmental procedures, areas off limits to training, and natural resource considerations and restrictions.

The Base Regulations (BO P5000.2J) establish the responsibilities and procedures that govern the conduct of all persons and activities at Camp Pendleton. Within the Base Regulations is a chapter on Environmental Security with sections that outline the Base policies governing natural and cultural resources and environmental compliance and protection. Also within the Base Regulations is a section on housing regulations, including the Base's policy on the possession of pets (most exotic pets are prohibited basewide and housing areas adjacent to sensitive resources have restrictions on the possession of normal domestic household pets, such as dogs and cats).

Environmental Compliance and Protection Standard Operating Procedures

Commanders of Marine Corps installations are responsible for the publication of a single environmental compliance and protection standard operating procedures (ECPSOP) document. A single ECPSOP for an installation ensures continuity of effort and prevents conflicts in policies between the various environmental media programs. The ECPSOP is complementary to, but not redundant with, the Marine Corps Order P5090.2A (Marine Corps Environmental Compliance and Protection Manual) and contains material compiled from existing Base Orders, Standard Operating Procedures, Biological Opinions, etc. MCAS published its own ECPSOP, which is presently being updated.

Environmental Guidebook

The Camp Pendleton Environmental Guidebook is a quick-reference introduction to environmental issues, laws, and regulations confronting Marines, sailors, soldiers, and civilian employees on Camp Pendleton. The guidebook provides points of contact for users of the Base to obtain further information.

Categorical Exclusions

The Council on Environmental Quality (CEQ) and DoN regulations provide for the establishment of categorical exclusions (CXs) for actions that have been found to have no significant effect individually or cumulatively on the human environment and, therefore, for which neither an Environmental Assessment nor an Environmental Impact Statement is required. CXs apply to only those kinds of actions that do not significantly affect the quality of the human environment, that result in no significant change from existing conditions at the site of the proposed action, or whose effect is primarily economic or social. A Decision Memorandum is used to document the use of a CX. The strict conditions associated with the use of CXs and the extensive array and locations of sensitive resources at Camp Pendleton has necessitated the inclusion of PIs in those Decision Memoranda. These PIs include project/location specific and general basewide instructions for avoiding impacts and ensuring that actions remain under the approved CX.

Architectural and Engineering Environmental Guidebook

The Air Station has published an Architectural and Engineering Environmental Guidebook for dissemination to contractors. The Architectural and Engineering Environmental Guidebook provides information, instructions, and procedures for environmentally sound designs and construction.

4.0.2.3 ENVIRONMENTAL INSPECTION AND COMPLIANCE

Monitoring the success of natural resource management is part of the role of the Marine Corps Environmental Compliance and Evaluation program, the Self-Audit Program, and the Annual Plan of Action and Milestones. The Marine Corps conducts internal environmental and natural resource audits and inspections through its Environmental Compliance Evaluation Program. Camp Pendleton's Environmental Inspection and Compliance Program is consistent with Marine Corps guidance and policy, and consists of HQMC conducted Benchmark ECE assessments and annual Self-Audits conducted by both MCB and MCAS Camp Pendleton.

Marine Corps Environmental Compliance Evaluation (ECE)

HQMC-sponsored Benchmark ECEs are conducted once every 3 years, with a formal Annual Validation of POA&M (described below) report provided during intervening years. The results are used as a tool for the commander and the Commandant of the Marine Corps to plan, program, budget, and execute initiatives to achieve compliance. Comparison of the Benchmark ECE results is made for overall trend analysis Marine Corps wide. HQMC has established the following goals for the ECE Program:

- To provide the commander with a tool to evaluate the command's environmental compliance
- To assess compliance levels and, as required, provide recommended corrective actions or improvements
- To provide a forum for the exchange of ideas and successes
- To provide the CMC with a broad evaluation of environmental compliance across the Marine Corps
- To provide a formal interface among installations, Fleet Marine Forces commanders, and the Inspector General of the Marine Corps
- To integrate environmental awareness into every facet and function of the Marine Corps way of life
- To improve overall compliance efforts through a continuous, integrated program

The ECE is an evaluation similar to those conducted by the Inspector General of the Marine Corps or Field Supply Maintenance Analysis Office and is designed to provide commanders with an assessment of their environmental compliance status. It assesses the command's level of compliance, identifies actions necessary to correct deficiencies, provides follow up on the implementation of those proposed actions, and facilitates continuous improvement in compliance efforts through the Self-Audit Program

In order to standardize ECEs and ensure all environmental requirements are properly and thoroughly evaluated, a Windows-based automated database comprised of checklists for use by commanders and ECE teams was developed. This Automated Compliance Evaluation (ACE) software is the only authorized software for tracking Marine Corps environmental compliance efforts. ACE is a large database comprised of several checklists. The ACE database presents all known federal requirements applicable across Marine Corps installations, specific state and local requirements unique to each installation, and requirements specified in the ECE Manual. To avoid any misinterpretation of requirements, the ACE system uses the exact requirements from the applicable source document to formulate questions. ACE provides the commander with a vehicle to evaluate the command's environmental compliance position by identifying actual environmental requirements. As a listing of specific requirements, it serves as a quick reference to installation users. ACE can be modified by the installation user to fit specific Marine Corps commands/units and tenants or media evaluations. Installation and command unique requirements, such as Camp Pendleton’s use of the local Air Pollution Control District’s Rule 6, have been built directly into the ACE database for Camp Pendleton. The most important management feature of the ACE database is the generation of a POA&M for each ECE or inspection conducted. The

CMC updates the installation unique ACE software annually with each installation receiving a specific checklist based upon state and local requirements.

Annual Environmental Compliance Evaluation (Self-Audit Program)

Working in conjunction with the CMC sponsored ECE, MCB and MCAS Camp Pendleton each conduct an annual ECE as part of a Self-Audit Program. These Self-Audit Programs serve as an internal plan for the Commanding General, MCB Camp Pendleton and the Commanding Officer, MCAS Camp Pendleton to assess compliance throughout their commands, including all tenant commands and activities. These Self-Audit Programs use the ACE software and the HQMC provided list of requirements as a tool to track compliance. The goal of these Self-Audit Programs is to assess compliance by annually visiting every permitted site and source, and every process potentially subject to an environmental requirement including all natural resource programs and BO terms and conditions. These annual self-audits verify that all requirements are met and ensure the effectiveness of environmental programs. The Inspection and Compliance Division of AC/S ES coordinates MCB Camp Pendleton's Self-Audit program and the MCAS Environmental Management Department coordinates the MCAS Camp Pendleton Self-Audit Program.

Annual Plan of Action and Milestones (POA&M) Process

An integral part of all evaluations conducted on Base is appropriate follow-up to ensure that corrective actions are completed. ACE allows an evaluated commander to develop and track the command's POA&M as part of the ECE documentation. Installation commanders must use this capability in developing and maintaining POA&Ms that result from the HQMC sponsored ECEs. Commanders are also encouraged to use the POA&M capability as part of their Self-Audit Programs. Once a year on the anniversary of the most recent Benchmark ECE, the installation commander evaluates, updates, and forwards the POA&M to the HQMC. This POA&M is the primary requirement and document supporting the "Annual Validation of ECE POA&M."

The Annual Validation of the Benchmark ECE POA&M meets the EPA recommendation to follow up formally on Benchmark ECE deficiencies. It replaced the Program Management Review and should not be confused with the Self-Audit Program. The installation commander conducts an annual review and verification of the POA&M from the most recent Benchmark ECE. This process certifies that reviews and validation of the POA&M are complete. It includes copies of the updated POA&M and the environmental self-audit schedule of the installation's Commanding General's Inspection Program as enclosures.

4.0.2.4 ENFORCEMENT

Several organizations on Base provide enforcement capability to help ensure compliance with natural resource laws, regulations, and management initiatives. These include the Range Operations Division (AC/S O&T), Resource Enforcement and Compliance Branch (AC/S

ES), Provost Marshal's Offices (AC/S Installation Security Safety and MCAS), Semper Fit Division (AC/S Marine Corps Community Services), and the Resident Officer in Charge of Construction (AC/S Facilities) described below (see also Figures 1-1, 1-2, and Appendix H).

Natural resources management and planning staff within AC/S Environmental Security and MCAS Environmental Department also contribute to the enforcement of laws, regulations, and management initiatives. The Assistant Chief of Staff Environmental Security has developed, and is in the process of implementing, an Environmental Incident Reporting System for the documentation and tracking of all environmental incidents (including non-compliance with Biological Opinion terms and conditions). Also, to improve existing tracking and monitoring of NEPA projects, mitigation, and compliance with permits, the AC/S ES is in the process of developing a computer based NEPA project tracking program (E-Trax) and a mitigation database (see Section 4.12.1).

Violations documented by Base organizations responsible for compliance are reported in accordance with existing regulations to the appropriate state or federal agency and Headquarters, Marine Corps. Violations are referred to the Base Commanding General or the Commanding Officer MCAS for determination regarding investigation, adjudication, and corrective and/or punitive action. Law enforcement aboard the Base associated with individual actions beyond official federal duties, including poaching, is the responsibility of the Provost Marshal's Office, or other entity as directed by the Commanding General, with technical assistance from the Natural Resources Department (AC/S ES). Occasionally, the services of state and federal fish and wildlife agency enforcement personnel are involved where their technical expertise or extra manpower is needed. Marine Corps policy is to permit access to installation lands by federal, state, and local conservation personnel for official purposes after proper safety and security measures are taken (HQMC 1998).

Range Operations Division, AC/S Operations and Training

The Range Operations Division, AC/S O&T is the on-site controlling agency for all ranges, training areas, and air/sea space, providing a safe, three dimensional, and realistic training environments with real time resolution of scheduling conflicts and control and coordination of training activities. As part of its management function, the Range Operations Division inspects ranges, training facilities, and training areas to ensure safe use and compliance with appropriate directives, including BO P3500.1_ (*Base Range and Training Regulations*), which includes the Fire Danger Rating System and programmatic instructions protecting sensitive natural resources.

Resource Enforcement and Compliance Branch, AC/S Environmental Security

The Resource Enforcement and Compliance Branch (RECB) under the AC/S ES is staffed with Game Wardens and Deputy Game Wardens. The RECB is responsible for ensuring that fish and wildlife laws on Camp Pendleton are enforced in accordance with federal and state laws, Marine Corps Orders, annual Base Bulletins, and other applicable regulations. The RECB provides personnel who are authorized as federal officers to enforce state and federal

Fish and Game regulations and administer the Base's hunting, fishing, camping, and other outdoor recreational programs.

The Conservation Supervisor/Game Warden Supervisor is Camp Pendleton's law enforcement official for federal and state laws and regulations pertaining to fish, wildlife, and natural resources. The Conservation Supervisor/Game Warden Supervisor appoints Game Wardens and Deputy Game Wardens as required. Game Wardens and Deputy Game Wardens are authorized to conduct searches pertinent to fish, wildlife and natural resources, in accordance with federal and state laws, BO P5821.1 (Standard Operating Procedures for Legal Matters), and other Base regulations.

Duties of the Game Warden within the RECB include:

- Enforcement of natural resource regulations
- Enforcement of campfire restrictions
- Administration of the hunting, fishing, and undeveloped camping programs
- Patrolling the Base
- Implementing habitat conservation programs
- Responding to inquiries or problems involving wildlife
- Recovering selected injured wildlife and road kills
- Confiscating exotic pets
- Giving educational and instructional briefs to users of the Base
- Monitoring the locations of the Base's resident bison herd

Federal Citations (DD Form 1805) are used for violations of federal Fish and Wildlife laws. A copy of DD Form 1805 is forwarded to the Staff Judge Advocate with a complete report prepared by the issuing officer describing the circumstances surrounding the alleged violation. Personnel are not detained by Deputy Game Wardens after citations have been issued. Resource contraband is seized and noted on the citation and in the report. Citations are adjudicated in the Federal Court in San Diego.

A Camp Pendleton Base Citation may be used to cite military personnel for violations of Base, federal or state regulations. A copy of the Base Citation is forwarded to the Commanding Officer of the person being cited with a complete report prepared by the issuing officer (if requested) describing the circumstances surrounding the alleged violation. Commanding Officers have the authority to impose punitive and non-punitive punishment under the Uniform Code of Military Justice for violations of regulations.

Provost Marshal's Office (PMO)

The Provost Marshal's Offices of MCB and MCAS provide overall law enforcement and physical security for Camp Pendleton and enforce federal and state laws and military regulations. Military Police provide physical security for and patrol Camp Pendleton. Working in conjunction with Range Operations Division and Game Wardens, the Military Police enforce restrictions and closures of areas to nonmilitary activities and apprehend

civilian and military personnel involved in unauthorized activities in natural resource and training areas.

Semper Fit Division, AC/S Marine Corps Community Services (MCCS)

The Semper Fit Division of AC/S MCCS operates the recreation program aboard Camp Pendleton including recreation at the beaches and developed campgrounds. Lifeguards and management personnel control patrons activities in accordance with PIs established to help avoid and/or minimize adverse impacts to sensitive resources located near beaches and recreation facilities. In addition, beach campgrounds have a volunteer night host residing on site who helps provide after hours supervision.

Resident Officer in Charge of Construction (ROICC)

The Resident Officer in Charge of Construction is the command under the Naval Facilities Engineering Command, Southwest Division that is responsible for the post contract award administration of construction, maintenance, and repair projects. Among other responsibilities, the ROICC serves as a Contracting Officer, empowered to obligate the federal government and to enforce the contractual requirements for which a given contractor is responsible. In as much as NEPA documentation, permit and mitigation requirements are often passed along to the construction, maintenance, or repair contractor, the ROICC enforces the contract requirements including these environmental requirements and/or actions.

4.1 ECOSYSTEM MANAGEMENT

The long term success of conservation efforts, both on Base and within the region, depends upon natural resource management at the ecosystem level. Ecosystems are complex and dynamic by nature, with components that are interrelated and operating at different rates. The distribution and abundance of species and communities and underlying ecological and physical processes occur irrespective of land ownership or management boundaries. An ecosystem functions as a whole, not as a collection of parts; yet, its integrity may be disrupted by excessive “interference” of any single component. Thus, conservation and management initiatives that operate within arbitrary boundaries and fail to recognize the interconnectedness of processes within the larger context of an ecosystem may unduly waste scarce resources or, worse, contribute to greater ecological problems in the long term.

The DoD has recognized the value of ecosystem management and has established principles and guidelines for natural resource managers on military installations (Section 1.3.3). Ecosystem management require a shift from the management of single species or habitats to the management of multiple species and habitats. Regulatory requirements (e.g, ESA) have historically fostered a greater emphasis on species-by-species management approach. Camp Pendleton’s more recent endeavors (e.g., the Riparian and Estuarine/Beach Ecosystem Management Plans) better reflect the principles of ecosystem management. However, Camp

Pendleton's future vision of its natural resource management is to further develop, promote, and refine its comprehensive, ecosystem based management program. The aim of this approach is to promote the conservation of native species and habitats, ensure the sustainability and biological diversity of terrestrial and aquatic ecosystems, and facilitate maximum support of the Base's military training mission and infrastructure, while simultaneously ensuring compliance with applicable laws and regulations.

Successful ecosystem management strategies will require innovative and new approaches to land use decisions and regional involvement. Camp Pendleton is working to define and understand its regional relevance and is committed to fulfill its responsibility to regional conservation efforts. Ecosystem management is innovative, requiring the use of the best available scientific information in decision making and adaptive management techniques. It requires the cooperation of and participation with external agencies and forming partnerships necessary to assess and manage ecosystems that cross political boundaries.

GOAL: Manage Camp Pendleton’s natural resources using an ecosystem management approach.

GOAL: Conserve the full range of extant vegetation communities.

GOAL: Maintain functional wildlife corridors and habitat linkages between critical biological resources and with regional linkages.

4.1.1 General Ecosystem Management on Camp Pendleton

Camp Pendleton’s natural resources management programs will continue to be directed toward achieving natural resource management goals. To ensure that individual programs at Camp Pendleton are working towards an ecosystem approach, it is important to develop a vision of desired future conditions that integrates ecological, socioeconomic, and institutional perspectives. This vision should incorporate a regional perspective and be developed in collaboration with appropriate regional land use, management, and planning agencies (see also Section 4.1.2).

An important component of ecosystem management is adaptive management. Because our knowledge of ecological systems and processes is inherently limited (due in part to changing conditions), we must continuously learn how to better manage. Flexibility and adaptation in the face of uncertainty are critical (Leslie et al. 1996). At the heart of adaptive management is a willingness to approach all management decisions as experiments to be tested (Leslie et al. 1996). Hypothesis testing, assessments of the efficacy of management techniques, and incorporation of knowledge gained over time are key to successful adaptive management.

OBJECTIVE: Develop a collaborative vision of desired future conditions that integrates ecological, socioeconomic, and institutional perspectives, applied with a geographic framework defined primarily by natural ecological boundaries.

Priority Planned Actions:

- In collaboration with Camp Pendleton land users, federal, state, tribal, local governments, nongovernmental organizations, private organizations, and the public, develop a shared vision of what constitutes desirable future ecosystem conditions. 2003. [Also applies to Sections 4.1.2, first objective; 4.4.1.]

- In collaboration with Camp Pendleton land users, federal, state, tribal, local governments, nongovernmental organizations, private organizations, and the public develop a shared vision of what constitutes desirable future watershed conditions for the Santa Margarita River and the San Mateo Creek. 2003. [Also applies to Sections 4.1.2, first objective; 4.7.2, first objective.]

OBJECTIVE: Develop a framework for performing adaptive management.

Priority Planned Actions:

- Develop and implement a formal lessons learned protocol to facilitate adaptive management. 2002.

- Develop and implement an Adaptive Management Plan for MCAS. 2002. [Also applies to Section 4.12.5.]

4.1.2 Regional Planning, Partnering, and Involvement

Ecosystem management requires the stewardship of resources on Base as well as involvement at the regional level. While the management and protection of natural resources within the Base's boundaries are important (and contribute to regional conservation efforts), Camp Pendleton recognizes that long term sustainability of ecosystem processes and watershed functioning requires a regional perspective and a coordination of efforts to achieve common goals. Adequate provision for, and promotion of, biodiversity conservation within the region surrounding Camp Pendleton will help to ensure functioning landscape linkages and wildlife corridors to Base ecosystems.

Implementation of an ecosystem approach requires decision making on a host of issues, both local and regional, short and long term, and involvement by many different groups operating at many different organizational levels. Depending upon the issue, the level of involvement by the Base ranges from passive vigilance to active participation. In all situations of regional involvement, effective communication and the fostering of positive, long lasting relations with surrounding communities and diverse interest groups greatly improves the success of the natural resources program and benefits the overall status of the Base.

Camp Pendleton is working to ensure that its land use and regional planning efforts are complementary with surrounding biodiversity conservation efforts such that Base lands help support the region's habitat conservation needs while also providing continued support of the Base's mission. Part of this effort involves actively monitoring and/or providing input to each of the following regional conservation planning and research efforts: (1) County of San Diego's MSCP, (2) North San Diego County MHCP, (3) North County Wildlife Forum, (4) the Coordinated Resource Management Planning group, which consists primarily of major federal and state land managers in support of regional biodiversity; (5) South and Central-Coastal Orange County Subregional plans, and (6) Riverside County's Multiple Species and Habitats Conservation Plan and the new Riverside County Integrated Planning program.

Camp Pendleton encourages local, state, and federal involvement and participation in regional biodiversity conservation and management planning that ensures the continued existence of all species and resources of regional importance, consistent with existing land uses and regional economic needs. Examples of such initiatives that Camp Pendleton is currently involved with include:

- Santa Margarita River Watershed Management Program,
- Team Arundo Watershed Exotics Control,
- Santa Margarita and San Luis Rey Weed Management Area Program,
- Santa Margarita Ecological Reserve,
- The Nature Conservancy Cooperative Agreement (signed in 1988) for the maintenance of biological diversity on DoD installations, and
- Camp Pendleton Alternative Futures Study.

Another form of regional involvement is the generation and sharing of regionally useful data. Much of the knowledge gained from data derived on the Base can be directly applicable to issues of regional concern and has a clear benefit to local and regional management and planning efforts. Base sponsored research, surveys, and monitoring contribute to the regional understanding of species, habitats, and ecosystem dynamics. In fact, several studies on Base have been part of larger, regional projects. For example, survey sites on Base have contributed to the international Monitoring Avian Productivity and Survivorship program (Section 4.4.2) and to a regional study of the diversity and autecology of amphibians and reptiles within the California portion of the California Floristic Province (Fisher 2000; data from these herpetological survey sites have also contributed to Holland & Goodman 1998a,b). Lastly, symposia, such as the arroyo toad symposium sponsored by MCAS in 2000 (see Section 5.5), also contribute to regional conservation and management initiatives in that they may facilitate the interaction of, and sharing of information among, public and private agency professionals.

Camp Pendleton routinely makes available and provides data and copies of completed reports and surveys conducted on Base and is partnering with several groups to improve regional sharing of ecological data. The Base is participating in a regional Geographic Information System database information exchange with SANDAG to enhance documentation of regional biodiversity. The Base is also working with The Nature Conservancy and San Diego State

University to develop a riparian monitoring program related to its pending water rights settlement agreement with Rancho California Water District. To that end, the Marine Corps has provided $100,000 of Legacy funding to San Diego State University (SDSU) to develop a web-accessible data base for hydrology, water quality, sediment, and habitat and biocriteria data. SDSU's work is part of a larger regional effort to develop an Internet environmental data transfer system to support regional planning and research. At the same time, Camp Pendleton is participating in an effort, funded initially by the U.S. Bureau of Reclamation, to develop a science-based, watershed-scale water quality monitoring program. That effort also includes database design, and the Base is coordinating between the Reclamation consultants and SDSU, to avoid duplication or contradiction in their work products.

In addition to contributing to the region through Base funded surveys and research, Camp Pendleton also supports limited non-Base funded research by providing access to the Base, when compatible with military training, safety, and natural resource management goals, for qualified research projects that are regional in nature. Such projects often support one or more natural resources management program goals and objectives as well as contribute to the Base's overarching natural resource management goal of encouraging regional plans and incentives that address conservation of native biodiversity, ecosystem sustainability, and watershed management issues. Examples of non-Base funded research supported over the last several years include the following:

- California Gnatcatcher Habitat Utilization Research : Bill Wirtz (Pomona College)
- Monarch Butterfly (*Danaus plexippus*) Overwintering: Dave Marriott (The Monarch Program)
- Golden Eagle Survey (*Aquila chrysaetos*) of San Diego County: Dave Bittner and John Oakley (Eagle Survey Project)
- Status of Golden Eagle Population on Camp Pendleton: Peter Bloom (Independent Researcher)
- Long-Term Raptor Population Research: Peter Bloom (Independent Researcher)
- San Diego Bird Atlas: Phil Unitt (San Diego Natural History Museum)
- Foraging Behavior of Terns in Southern California: Dan Robinette and Patricia Heron Baird (California State University at Long Beach)
- Arroyo Toad Movement, Mortality, and Habitat Utilization in San Mateo Creek: Paul Griffin (University of California at San Diego)
- Capacity of the Santa Margarita River to assimilate nitrite and other constituents associated with treated sewage effluent: Rancho California Water District

Another form of regional involvement and partnering by the Base is through public education and awareness programs (see also Section 5.5). Environmental staffs conduct frequent slide presentations on natural resources and Base management programs to a variety of on-Base and off-Base groups such as conservation organizations, service groups, and college classes. Base personnel also lead field trips to observe wildlife and discuss management programs. Group tours have included an annual tour for the Friends of the Santa Margarita River, the Biodiversity Research Consortium, National Research Council, and regulatory agencies. During 1998, a major Earth Day celebration was held on Base and involved live animal

displays of local reptiles, birds, and various mammals. News articles are prepared periodically for the Base paper and interviews are given frequently to local newspapers. Staff also participates with local high schools in a School-to-Career program, orienting students monthly to the environmental compliance and natural resource management professions, education requirements, and expertise being exercised at the Base.

OBJECTIVE: Develop a collaborative vision of desired future conditions that integrates ecological, socioeconomic, and institutional perspectives, applied with a geographic framework defined primarily by natural ecological boundaries.

Priority Planned Actions:

- In collaboration with Camp Pendleton land users, federal, state, tribal, local governments, nongovernmental organizations, private organizations, and the public, develop a shared vision of what constitutes desirable future ecosystem conditions. 2003. [Also applies to Sections 4.1.1, first objective; 4.4.1.]

- In collaboration with Camp Pendleton land users, federal, state, tribal, local governments, nongovernmental organizations, private organizations, and the public develop a shared vision of what constitutes desirable future watershed conditions for the Santa Margarita River and the San Mateo Creek. 2003. [Also applies to Sections 4.1.1, first objective; 4.7.2, first objective.]

OBJECTIVE: Develop an understanding and involvement in other regional ecosystem based conservation plans.

Priority Planned Actions:

- Obtain available vegetation data for areas that are surrounding and adjacent to Camp Pendleton and enter it into a GIS database. 2002. [Also applies to Section 4.2.1, first objective.]

- Assess the feasibility and desirability of conducting off-Base surveys of selected species and habitat types, water quality monitoring, and hydrographical surveys to contribute to the understanding of Camp Pendleton's regional contribution to species and habitat conservation and recovery. 2003. [Also applies to Sections 4.2.1, first objective; 4.2.2, first and second objectives; 4.5.2, first and second objectives.]

- Sponsor/support scientific research in support of regional understanding and Base management goals by qualified personnel. Ongoing. [Also applies to Sections 4.2.2, third objective; 4.4.2, second objective.]

- Develop a decision support framework for performing ecosystem management. 2002.

- Maintain a regional planning database and perspective on regional plans, habitat conservation plans, and other initiatives in the Riverside, Orange, and San Diego County Area. Ongoing.

- Evaluate the feasibility of participating in cooperative watershed restoration programs, including cooperating with local governmental and nongovernmental stakeholders. Ongoing. [Also applies to Sections 4.3.1, first objective; 4.5.4; 4.7.1, first objective.]

- Participate in regional forums and planning initiatives for the removal of invasive, exotic species. Ongoing. [Also applies to Sections 4.6.1; 4.6.2.]

4.2 NATURAL RESOURCES INVENTORY

Maintaining a natural resources inventory helps guide land use, land management, and restoration decisions that facilitate the sustainability of military activity over time. Camp Pendleton's natural resources inventory is largely, but not entirely, a GIS based assemblage of data reflecting (1) distribution and abundance (size, density) parameters for a range of taxaand plant community and habitat types on Base and (2) physical characteristics, processes, and changes, including soil types, tide levels, water quality, and the frequency and extent of wildland fire and erosion. Additional information for some species/resources, such as habitat quality, number of breeding individuals, and an accounting of incidental take, is also part of the Base's inventory.

Data within the inventory are generated from a variety of sources and at different scales, including project specific surveys, species specific monitoring, community based surveys, research projects, and surveys of anthropogenic impacts. Many of the surveys and monitoring efforts on Base are driven by regulatory requirements (e.g., USFWS Biological Opinion terms and conditions, NEPA procedures, etc.). As funding becomes available, additional surveys are conducted to augment the Base's inventory of information on natural resources (e.g., in the past the Base has funded reptile, amphibian, and bat surveys). The Base periodically accepts proposals from qualified outside investigators who wish to survey and monitor other populations or communities. This policy has resulted in reports that catalog Camp Pendleton's insect and arachnid species, and annual status of golden eagle (*Aquila chrysaetos*) and other raptor nests.

The establishment and maintenance of a natural resources inventory is an essential component of conservation and adaptive management (U.S. DoD 1996). It enables the tracking of changes over time, contributes to an understanding of the structure and function of the larger ecosystem to which the Base belongs, assists project specific and master planning efforts, and facilitates an evaluation of impacts and the effectiveness of management efforts. Ultimately, maintenance of the natural resources inventory enables the efficient and effective accomplishment of management program goals and objectives.

GOAL: Develop and maintain an inventory of natural resources to support management programs and the ability to conserve and enhance native fauna and flora and the functional value of natural systems.

GOAL: Categorize natural processes and impacts to natural resources through monitoring, investigative research, and data analysis in order to make informed decisions necessary for maintaining training lands.

GOAL: Continue to develop and maintain comprehensive data collection and processing systems to facilitate informed management decisions.

GOAL: Ensure that scientifically sound and commonly accepted data collection methods and sampling techniques are used to update natural resource inventories.

4.2.1 Vegetation and Habitat Mapping

Fundamental to the understanding of land use and land management capabilities, and the assessment of community and ecosystem health, is the identification of vegetation types and their distribution on Base (along with climate, available moisture, and other physical features of a landscape). Vegetation largely determines the type and distribution of animals that can be supported by a system. Compared to animal populations, vegetation is relatively stable over time. Therefore, the required frequency for vegetation mapping is less than that for animals. Nonetheless, the description, classification, and mapping of vegetation on Base are not without complexities. For example, there is no universally agreed upon method for describing or classifying vegetation, although Holland (1986), Sawyer and Keeler-Wolf (1995), and The Jepson Manual (Hickman 1993) are commonly cited vegetation classification references in California. The assemblage of species within vegetation types varies continuously. No two hillsides have exactly the same vegetation. On southern Californian shrub lands, it is common to have a "patchwork" or mosaic of small blocks of different community types with indistinct transition zones between them.

The GIS vegetation coverage currently in use by Camp Pendleton's natural resource managers and planners was originated by the San Diego Association of Governments in the early 1990s, and updated in 1995. SANDAG's vegetation mapping was part of a countywide effort to support the region's habitat conservation planning efforts. Thus, the SANDAG vegetation databases are regional in nature, varying in levels of detail and scale. Finer vegetation details were collapsed into broader categories and limited field reconnaissance was conducted in the mapping efforts.

Due to its limited size, MCAS has collected vegetation data at a higher resolution than the rest of the Base (with the exception of site specific surveys for projects). A vegetation survey of MCAS was recently completed and is expected to serve as the primary planning data set over the next five years. Moreover, floodplain and wetlands delineations have been completed for the entire Air Station.

OBJECTIVE: Develop and maintain an inventory of vegetation and selected habitat types on Camp Pendleton and in surrounding communities (e.g., distributions, occurrences, incidental take, photographic archive, etc.), using high quality and up-to-date GIS maps where appropriate and desirable.

Priority Planned Actions:

- Track plant community distribution, habitat function and value, and vegetation age classes. Ongoing. [Also applies to Sections 4.3.1, first objective; 4.3.4.] [Compliance requirement of Riparian BO (T&C, Appx 4, p.1)]

- Ensure that all GIS layers from surveys conducted on Camp Pendleton are in a format that meets specified in-house criteria (Appendix R). Ongoing.

- Annually update fuel load hazard mapping. Ongoing. [Also applies to Section 4.11.1.]

- Continue to develop a GIS wetlands mapping coverage for Camp Pendleton that supports proactive planning and impact avoidance. Ongoing. [Also applies to Sections 4.3.1, first objective; 4.3.2.]

- Maintain high quality and up-to-date GIS mapping of vernal pools on Camp Pendleton that supports proactive planning and avoidance of impacts. Ongoing. [Also applies to Section 4.3.2.]

- Conduct high-resolution aerial photography of the riparian and estuarine areas on Camp Pendleton every two years. 2002, 2004, 2006. [Also applies to Sections 4.3.1, first objective; 4.3.4.] [Compliance requirement of Riparian BO (Recom p. 39; T&C, Appx 4, p. 1; T&C, Appx 5, p. 4)]

- Obtain available vegetation data for areas that are surrounding and adjacent to Camp Pendleton and enter it into a GIS database. 2002. [Also applies to Section 4.1.2, second objective.]

- Develop a GIS based vegetation age class distribution map of the Base that shows levels of fuel loading. 2002. [Also applies to Section 4.11.1.]

- Conduct high-resolution ortho-rectified photography of the entire Base every five years. 2003.

- Assess the feasibility and desirability of conducting off-Base surveys of selected species and habitat types, water quality monitoring, and hydrographical surveys to contribute to the understanding of Camp Pendleton's regional contribution to species and habitat conservation and recovery. 2003. [Also applies to Sections 4.1.2, second objective; 4.2.2, first and second objectives; 4.5.2, first and second objectives.]

- Conduct high-resolution aerial photography of upland habitats on Camp Pendleton at the frequency required under the Upland Biological Opinion. TBD.

Other Planned Actions:

- Update basewide vegetation mapping of Camp Pendleton every four to five years. As needed, perform minor updates. ***

- Initiate floodplain delineations and watershed analyses basewide. Through appropriate hydrographic modeling, determine the various flood event levels for selected areas on Base. [Also applies to Section 4.3.1, second objective.] *

- Establish a digital and georeferenced photographic archive in GIS of each vernal pool group to help monitor changes over time. [Also applies to Section 4.2.3.] *

- Coordinate the acquisition of aerial photographs of watersheds. *

4.2.2 Species Specific Surveys/Monitoring

Species surveys help reveal the abundance and distribution of plant and animal populations on Camp Pendleton. Monitoring is essential for tracking and analyzing changes in population parameters (e.g., size, density, and distribution) and habitat type and quality over time. The Base conducts surveys and monitoring for selected species for a variety of reasons. A high priority for natural resources management is the monitoring of federally listed threatened and endangered species on Base to ensure compliance with regulatory requirements and to assist in the recovery efforts for those species (Section 4.5.2). Selected candidate, rare, sensitive (e.g., state listed species, migratory birds), and other (e.g., game and exotic) species may also be surveyed or monitored. Monitoring on species specific levels will help prepare the Base for potential future listings, assist with the management of consumptive recreational programs, evaluate the efficacy of management techniques, and provide additional indices of ecosystem health.

OBJECTIVE: Develop and maintain an inventory of *federally listed threatened and endangered species* on Camp Pendleton (e.g., distributions, occurrences, breeding success, predation rates, incidental take, etc.), using high quality and up-to-date GIS maps where appropriate and desirable.

Priority Planned Actions:

- Ensure that all federally listed threatened and endangered species known to occur on Base are monitored in accordance with USFWS Biological Opinions. Ongoing. (See Threatened and Endangered Species Management, Priority Planned Actions.) [Compliance requirement of Riparian/Uplands BO]

- Incorporate project specific survey data for federally listed species into the GIS species distribution database. Ongoing. [Also applies to Section 4.5.2, first objective.]

- Use the Environmental Incident Reporting System to collect, maintain, and report information about environmental incidents that occur on Camp Pendleton. Ongoing. [Also applies to Section 4.2.3.] [Compliance requirement of Riparian BO (T&C, p. 32; T&C, Appx 4, p. 2)]

- Survey for the quino checkerspot butterfly as required by survey protocol. Ongoing.

- Continue to implement the monitoring program that tracks compliance with the levels of take, and the measures and terms and conditions of the Incidental Take Section of the Riparian BO. Ongoing. [Compliance requirement of Riparian BO (T&C, p. 37; T&C, Appx 4, p. 2)]

- Establish an Incidental Take Database that will catalog incidental takes on MCAS. 2002. [Compliance requirement of Riparian BO (T&C, p. 37; T&C, Appx 4, p. 2)]

- Assess the feasibility and desirability of conducting off-Base surveys of selected species and habitat types, water quality monitoring, and hydrographical surveys to contribute to the understanding of Camp Pendleton's regional contribution to species and habitat conservation and recovery. 2003. [Also applies to Sections 4.1.2, second objective; 4.2.1, first objective; 4.2.2, second objective; 4.5.2, first and second objectives.]

- Collect survey data on isolated ephemeral wetland invertebrates, including the endangered San Diego fairy shrimp and the Riverside fairy shrimp at levels and intervals to be determined in the Uplands Biological Opinion issued by the USFWS. TBD. [Also applies to Sections 4.2.2, second and third objectives; 4.5.2 first and second objectives.]

- Survey for the southern steelhead as determined in consultation with National Marine Fisheries Service and coordinate efforts and activities with CDFG. As needed, conduct genetic tests on a representative sample. TBD. [Also applies to Section 4.5.2, first objective.]

Other Planned Actions:

- Facilitate annual light-footed clapper rail surveys on Base. [Also applies to Section 4.5.2, first objective.] [Compliance requirement of Riparian BO (Appx 1, p. 83)] ***

- Survey for California red-legged frog. **

OBJECTIVE: Develop and maintain an inventory of selected *candidate, rare, and sensitive species* on Camp Pendleton. (e.g., distributions, occurrences, breeding success, predation rates, incidental take, etc.), using high quality and up-to-date GIS maps where appropriate and desirable.

Priority Planned Actions:

- Develop a standardized, regionally coordinated system for recording and mapping significant resource observations (plants, wildlife, erosion, damage, etc.). 2002. [Also applies to Section 4.2.2, third objective.]

- Develop a monitoring program for wildlife species of regional concern with a specific focus on those species likely to become proposed for listing as threatened or endangered in the near future. 2002. [Also applies to Sections 4.4.2, second objective; 4.5.2, second objective.]

- Assess the feasibility and desirability of conducting off-Base surveys of selected species and habitat types, water quality monitoring, and hydrographical surveys to contribute to the understanding of Camp Pendleton's regional contribution to species and habitat conservation and recovery. 2003. [Also applies to Sections 4.1.2, second objective; 4.2.1, first objective; 4.2.2, first objective; 4.5.2, first and second objectives.]

- Collect survey data on isolated ephemeral wetland invertebrates, including the endangered San Diego fairy shrimp and the Riverside fairy shrimp at levels and intervals to be determined in the Uplands Biological Opinion issued by the USFWS. TBD. [Also applies to Sections 4.2.2, first and third objectives; 4.5.2 first and second objectives.]

Other Planned Actions:

- Develop an inventory program for wildlife species of regional concern with a specific focus on those species on the Base likely to become proposed for federal listing as threatened or endangered in the near future. [Also applies to Section 4.5.2, second objective.] ***

- Survey for rare plant species to facilitate management planning. ***

- Survey for species on Base that have been proposed for ESA listing by the USFWS. [Also applies to Section 4.5.2, second objective.] ***

- Continue to evaluate the status of raptor populations and reproduction on Camp Pendleton. [Also applies to Sections 4.2.2, third objective; 4.4.2, second objective.] **

- Establish a wildlife population trend monitoring program for existing native sensitive and nongame fish and wildlife species as a component of long term ecological trend monitoring. [Also applies to Sections 4.2.2, third objective; 4.4.1.] **

OBJECTIVE: Develop and maintain an inventory of *other* species on Camp Pendleton (e.g., distributions, occurrences, breeding success, predation rates, incidental take, etc.), using high quality and up-to-date GIS databases where appropriate and desirable.

Priority Planned Actions:

- Sponsor/support scientific research in support of regional understanding and Base management goals by qualified personnel. Ongoing. [Also applies to Sections 4.1.2, second objective; 4.4.2, second objective.]

- Participate in Annual Christmas Bird Count on MCAS to compile data on what birds are winter residents on MCAS. Ongoing. [Also applies to Section 4.4.2, second objective.]

- Conduct Spring Bird Count on MCAS to provide a comprehensive record on the numbers of birds at the Station during the spring. Ongoing. [Also applies to Section 4.4.2, second objective.]

- Continue exotic plant site identification, monitoring, and control efforts in upland habitats to ensure a low reintroduction rate. Ongoing. [Also applies to Section 4.6.1.]

- Map the spread of exotic plants and successful removal by control programs, including regional data when possible. Ongoing. [Also applies to Sections 4.2.3; 4.6.1; 4.8.] [Compliance requirement of Riparian BO (T&C, p. 35; Appx 4- tracking community distribution/value, habitat status)]

- Annually conduct and track (inventory) animal damage control, predator management, and cowbird control activities on Base. Ongoing. [Also applies to Sections 4.4.2, first objective; 4.4.3, first objective; 4.6.2.] [Compliance requirement of Riparian BO (Appx 4, p. 2)]

- Develop a standardized, regionally coordinated system for recording and mapping significant resource observations (plants, wildlife, erosion, damage, etc.). 2002. [Also applies to Section 4.2.2, second objective.]

- Obtain Audubon Society bird data collected on Camp Pendleton. 2003. [Also applies to Section 4.4.2, second objective.]

- Incorporate U.S. Geological Survey and CDFG fish survey data into GIS species distribution database. 2003. [Also applies to Section 4.5.2, first objective.]

- Collect survey data on isolated ephemeral wetland invertebrates, other than candidate, rare and threatened and the endangered San Diego fairy shrimp and the Riverside fairy shrimp at levels and intervals to be determined in the Uplands Biological Opinion issued by the USFWS. TBD. [Also applies to Sections 4.2.2, first and second objectives; 4.5.2 first and second objectives.]

Other Planned Actions:

- Document occurrences of key exotic animals (e.g., species with potential to impact listed species) observed during survey efforts or that are incidentally encountered; use this information to schedule and prioritize exotic management actions. [Also applies to Section 4.3.1, first objective.] ***

- Continue to evaluate the status of raptor populations and reproduction on Camp Pendleton. [Also applies to Sections 4.2.2, second objective; 4.4.2, second objective.] **

- Establish a wildlife population trend monitoring program for existing native sensitive and nongame fish and wildlife species as a component of long term ecological trend monitoring. [Also applies to Sections 4.2.2, second objective; 4.4.1.] **

4.2.3 Long Term Trend Monitoring and Analysis

The long term monitoring and analysis of natural resources is essential for tracking ecosystem processes and trends and for adapting management initiatives to best suit Base resources and the military mission. The shift in focus from single species monitoring discussed in the previous section, to monitoring sites with multiple species and the inclusion of abiotic and anthropogenic factors would allow for a broader evaluation of ecological processes and potential causal relationships. Included in this section are initiatives such as the Base's Long Term Ecological Trend Monitoring (LTETM) project, the monitoring of abiotic factors (e.g., erosion, fire, and water quality), and the monitoring of anthropogenic impacts, including the Camp Pendleton Alternative Futures Study. Several of the trend monitoring actions included in this section are also components of other management programs on Base as well (e.g., erosion control and fire management).

The LTETM project is a continuation of and modification to the Land Condition Trend Analysis project that was initiated in 1990. LTETM serves as an annual data gathering tool to monitor ecosystem changes, the potential impacts of land use, and the efficacy of natural resource management practices. The LTETM project consists of nearly two hundred 100-m-long line transect permanent sample sites ("core" plots) and "special use" plots that are established as needed. To date, 38 special use plots have been established to monitor fire, erosion, restoration efforts, the effects of military training on Vasey's button celery

(*Eryngium vaseyi*), population dynamics of thread-leaved brodiaea (*Brodiaea filifolia*) and many-stemmed hasseanthus (*Dudleya multicaulis*), and population dynamics and fire ecology of Englemann oak (*Quercus englemanii*) woodlands.

To support erosion control efforts (see General Vegetation Management and Soil Conservation, Section 4.7.2), the Base began identifying and monitoring locations of erosion problems basewide in the late 1980s (Kellogg & Kellogg 1988). In 1997, a database of erosion sites (Soil Erosion Field Inventory) was developed to assist the Base in prioritizing its limited resources to better focus on areas where success was readily achievable.

Effective mapping and consistent knowledge of fire location, frequency, size, and pattern is necessary for long term trend analyses and proactively managing fire (see Section 4.11). Gaps in the fire records and inconsistent and sometimes inaccurate mapping of fires have made management difficult for the Base in the past. A fire history for Camp Pendleton, which was built from a combination of available records and remote sensing interpretation, was compiled as part of the update of the fire management plan in 1998. Since 1997, the Base has mapped the boundaries of all wildland fires greater than five acres in size outside of the impact areas (excluding prescribed burns). The intensity of burning within a fire perimeter had never been well documented on the Base. Yet, burning intensity can have enormous implications on the amount of vegetation removal and subsequent recovery rates for vegetation and habitat values. Development of a practical method for mapping burning intensities was finalized for the 1999 fire season.

The Camp Pendleton "Alternative Futures Study" (*Biodiversity and Landscape Planning: Alternative Futures for the Region of Camp Pendleton, California* [Steinitz 1996]) was conducted during 1995 by the Biodiversity Research Consortium, a team of investigators from the Harvard University Graduate School of Design, Utah State University, the National Biological Service, the U.S. Forest Service, The Nature Conservancy, and Marine Corps Base Camp Pendleton, with the cooperation of the two relevant regional planning agencies, the San Diego Association of Governments and Southern California Association of Governments. This study examined how urban growth and change in a 50-by-80-mile region situated between San Diego and Los Angeles (surrounding Camp Pendleton) might influence, or be influenced by, the region's existing biodiversity. This research study was funded by the Strategic Environmental Research and Development Program (SERDP), a joint program of the U.S. Department of Defense, the U.S. Department of Energy, and the U.S. Environmental Protection Agency, through a grant to the Western Ecology Division of the EPA's National Health and Environmental Effects Research Laboratory, and the U.S. Department of Agriculture Forest Service Pacific Northwest Research Station.

The purpose of the study effort and subsequent publication was educational, principally to provide information regarding issues, strategic planning options, and possible consequences related to regional development and associated impacts to biodiversity to the many stakeholders and jurisdictions in the region. As a follow-on to the study results, Camp Pendleton provided to both the DoD, SERDP, and EPA sponsors a "lessons learned" assessment from the original effort and provided further direction on how to undertake an expanded version of the study within the entire County of San Diego, including all military bases in the region.

As a result of the Alternative Futures Study, Camp Pendleton has realized direct benefit through the assurance that regional land use maps in the future include the "military" as an official land use category. Up to that point, local jurisdictions and regional planning agencies had assigned all military lands in the region as "unused." Further, tenets of the study are being used in planning biodiversity preserves off-Base to protect critical nodes which will support linkage to the Base's resources, supporting the most viable matrix of biologically diverse elements in the region. Camp Pendleton, in cooperation with the USFWS as the regional ecosystem manager, continues to use the Alternative Futures Study to influence off-Base regional planning efforts to help achieve species recovery plans and goals.

During 2000, Camp Pendleton initiated a follow on study to review and evaluate the Alternative Futures Study (Steinitz 1996). Existing conditions will be used to validate the results of the predictive models and to refine the regional biodiversity picture, including development of additional alternative futures projections in light of changes in growth and preserve patterns and current conservation planning in San Diego, Orange, and Riverside Counties. Further, the scope of study has been expanded to include: (1) MCAS Miramar and coastal San Diego County down to the San Diego River, (2) an evaluation of the sufficiency of regional habitat conservation plans to achieve conservation goals and biodiversity requirements within the parameters of alternative futures, (3) assessment of the recovery potential of select threatened and endangered species within the context of the alternative futures scenarios, and (4) an assessment of Camp Pendleton's and MCAS Miramar's role and contributions to regional biodiversity in view of the alternative futures scenarios. The results of this study will provide the Marine Corps and regional planners with an enhanced ability to understand and project the expected impacts of alternative futures scenarios on their ability to manage both land use and biodiversity. This study is expected to be completed in the fall of 2002 and will be made available to regional planners and interested parties.

OBJECTIVE: Monitor and analyze long term ecological, abiotic, and anthropogenic trends that will contribute to the understanding of ecosystem processes and to the ability to adaptively manage for a sustainable system.

Priority Planned Actions:

- Map the spread of exotic plants and successful removal by control programs, including regional data when possible. Ongoing. [Also applies to Sections 4.2.2, third objective; 4.6.1; 4.8.] [Compliance requirement of Riparian BO (T&C, p. 35; Appx 4)]

- Develop GIS layers of comparable datasets that allow for spatial and temporal change detection in populations of selected species and sensitive habitat types. Ongoing. [Also applies to Section 4.4.2, second objective.]

- Update the GIS database with wildland fire data annually. Map all wildland fires outside of impact areas that are greater than five acres and identify impacts to threatened and endangered species. Ongoing. [Also applies to Section 4.11.3.]

- Continue to monitor tide levels and water quality in the Santa Margarita River; evaluate potential changes to the estuarine ecosystem as a result of ongoing watershed actions and projects and document the periods when the other coastal lagoons are subject to tidal influence. Ongoing. [Also applies to Sections 4.3.3; 4.7.1, sixth objective.] [Compliance requirement of Riparian BO (T&C, Appx 4, p. 2)]

- Continue groundwater monitoring in all drainages where groundwater is extracted to determine and manage the potential effect on listed species habitat. Ongoing. [Also applies to Section 4.7.1, sixth objective.] [Compliance requirement of Riparian BO (T&C, Appx 4, p.1)]

- Monitor stream water quality, flood regimes, and storm event frequency. Ongoing. [Also applies to Section 4.7.1, sixth objective.] [Compliance requirement of Riparian BO (T&C, Appx 4, p.1)]

- Use the Environmental Incident Reporting System to collect, maintain, and report information about environmental incidents that occur on Camp Pendleton. Ongoing. [Also applies to Section 4.2.2, first objective.] [Compliance requirement of Riparian BO (T&C, p. 32; T&C, Appx 4, p. 2)]

- Establish monitoring plots to track natural resource recovery after wildland fire impacts. 2002. [Also applies to Section 4.11.3.]

- Develop and implement a Photo Transects Program to document and track changes in targeted areas on MCAS. 2002.

- Develop and begin implementation of a long term ecological monitoring program on MCAS. 2002.

- Evaluate the feasibility of adding portions of tracking systems (Range Facility Management Support System, E-Trax, etc.) that records the level of ongoing programmatic activities and documents trends in the frequency, magnitude, and extent of these activities to Natural Resources GIS layers. 2004.

Other Planned Actions:

- Monitor the effects of off road vehicle use and provide for the rehabilitation of training lands that have excessive degradation. [Also applies to Section 4.7.2, first objective.] **

- Conduct annual monitoring of Long Term Ecological Trend Monitoring plots. **

- Establish a digital and georeferenced photographic archive in GIS of each vernal pool group to help monitor changes over time. [Also applies to Section 4.2.1.] *

- Digitize, with high-resolution scanning, the historical and ongoing aerial photos of the Base and provide archival storage protection for the original prints. [Also applies to Section 4.14.2, first objective.] *

4.3 WETLANDS, ESTUARY/COASTAL, AND RIPARIAN MANAGEMENT

This section addresses the management of wetlands, estuary/coastal, and riparian areas on Camp Pendleton. Although wetlands include a wide range of habitat types, including swamps, marshes, and bogs, wetlands on Base are primarily riparian systems, estuaries, isolated ephemeral wetlands, and vernal pools. Descriptive statistics for wetlands, estuary/coastal, and riparian areas on Base are presented in Chapter 3. Management and use of these areas requires careful consideration of the CWA, ESA, and EO 11990 to prevent an overall net loss of wetlands, and their associated functions and values. Legislation and regulations relevant to wetlands, estuary/coastal, and riparian management are summarized in Appendix B.

Specific goals and commitments for quantities and quality of wetlands, estuary/coastal, and riparian habitats and populations of specific species in these areas have been established (in consultation with the USFWS) in the Estuarine and Beach Ecosystem Conservation Plan (Appendix D) and the Riparian Ecosystem Conservation Plan (Appendix E).

Camp Pendleton's Riparian and Estuarine/Beach Conservation Plans are habitat based. Their management strategy focuses on increasing habitat quality by eradicating exotic vegetation and encouraging growth of native vegetation, which, in turn, has been shown to support a greater number of listed species. In so doing, these conservation plans are also expected to support future federally listed threatened and endangered species and other species that utilize these habitats on Base.

These conservation programs take an adaptive management approach. Over time, many factors upon which these programs are based are likely to change, including military mission requirements, the federal list of threatened and endangered species, knowledge of the ecology and requirements of the listed species, as well as an understanding of the nature of anthropogenic impacts to those species. Some changes are foreseeable; others are not. In the face of uncertainty, the most prudent strategy is to recognize the possibility of surprise, act to detect it, and correct avoidable error.

The general management approach of these conservation plans can be characterized as the "managing of impacts." As such, they are divided into two components, one for the management of impacts that are *temporary* (e.g., from ongoing activities such as training, maintenance, and recreation) and one for those that are *permanent* (e.g., from infrastructure development projects).

For the management of temporary impacts from ongoing activities a suite of basewide management programs that directly and/or indirectly benefit listed species has been established to compensate for the temporary impacts that do occur. The goal of these compensation measures is to improve habitat value over time, thereby supporting larger populations of listed species.

For activities that would result in a permanent impact (often referred to as "projects"), the Base has established the following management strategy:

- A minimum habitat acreage guarantee has been established to prevent long-term accumulation of permanent impacts basewide. This regional commitment will help to support the current inventory of species and complement landscape linkages in the region.

- A Consultation Class System has been established to determine the level of communication/consultation required between the Service and the Base for projects/permanent impacts.

- Programmatic instructions for new projects were established to help avoid and minimize impacts to listed species and managed habitat during project design and construction.

- Appropriate type and amount of mitigation necessary for future projects was established in advance through consultation with the USFWS.

GOAL: Incorporate principles of ecosystem management into wetlands and coastal management to conserve and enhance native fauna and flora and the functional value of natural systems.

GOAL: Manage wetlands and coastal areas so they remain available and suitable for amphibious, land, and air based training.

GOAL: Monitor, conduct investigative research, and analyze data in order to make informed decisions necessary for maintaining training lands.

4.3.1 General Wetlands, Estuary/Coastal, and Riparian Management

Wetlands are highly productive, complex ecosystems. Wetland management is a challenge nationally and more so in California, which has lost a greater proportion of its original wetlands than any other state. General wetlands management actions are taken to ensure that all facilities and operational actions avoid, to the maximum degree feasible, wetlands destruction or degradation regardless of wetland size or legal necessity for a permit. Any facility requirement that cannot be sited to avoid wetlands must be designed to minimize wetlands degradation and must include compensatory mitigation as required by wetland regulatory agencies in all phases of project planning, programming, and budgeting. Within

this policy, use of Marine Corps lands and lands of other entities are permissible for mitigation purposes for Marine Corps projects when consistent with EPA and Army Corps of Engineers (ACOE) guidelines or permit provisions.

OBJECTIVE: Manage wetlands on Camp Pendleton to ensure no net loss of wetland functions and values.

Priority Planned Actions:

- Comply with Section 404 Clean Water Act permits issued by the ACOE to (1) ensure compliance with permits issued for DoD actions on the Base; and (2) to monitor the execution of special conditions of permits issued to non-DoD agency proposed actions. Ongoing.

- Continue to develop a GIS wetlands mapping coverage for Camp Pendleton that supports proactive planning and impact avoidance. Ongoing. [Also applies to Sections 4.2.1; 4.3.2.]

- Track plant community distribution, habitat function and value, and vegetation age classes. Ongoing. [Also applies to Sections 4.2.1; 4.3.4.] [Compliance requirement of Riparian BO (T&C, Appx 4, p.1)]

- Evaluate the feasibility of participating in cooperative watershed restoration programs, including cooperating with local governmental and nongovernmental stakeholders. Ongoing. [Also applies to Sections 4.1.2, second objective; 4.5.4; 4.7.1, first objective.]

- Conduct high-resolution aerial photography of the riparian and estuarine areas on Camp Pendleton every two years. 2002, 2004, 2006. [Also applies to Sections 4.2.1, 4.3.4.] [Compliance requirement of Riparian BO (Recom p. 39; T&C, Appx 4, p. 1; T&C, Appx 5, p. 4)]

- Continue until 2003 the study of the effects of the absence of effluent release into the Santa Margarita River. 2002, 2003.

- Ensure that all natural resource staff and/or contractors responsible for wetland conservation have obtained wetlands regulatory, policy, and formal delineation training and that at least one staff member has received this training at all times. 2002.

- Develop an assessment of, and apply for, a programmatic general permit for maintenance of diversion facilities, road crossings, culverts, and bridges through wetlands and flood prevention actions. 2004.

Other Planned Actions:

- Document occurrences of key exotic animals (e.g., species with potential to impact listed species) observed during survey efforts or that are incidentally encountered; use this information to schedule and prioritize exotic management actions. [Also applies to Section 4.2.2, third objective.] ***

- Identify candidate sites for future wetland mitigation to compensate for unavoidable wetland value losses (and include in future master planning documents). [Also applies to Section 4.12.3.] ***

- Enter into agreements to implement a Santa Margarita River watershed wetlands management program, which includes Base credits or banking for beneficial actions upstream of the Base. ***

- Enter into agreements to credit the Base for wetlands creation or enhancement in connection with Permit 15,000 development or Base participation in or cooperation with the Murrieta Creek Flood Control Project. *

OBJECTIVE: Manage floodplains on Camp Pendleton to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

Priority Planned Actions:

- During project and NEPA review, ensure that direct or indirect adverse impacts to federally listed species, critical habitat, floodplains, wetlands, and other sensitive resources are identified and avoided or minimized when possible. Ongoing. [Also applies to Section 4.12.1, first objective.]

Other Planned Action:

- Initiate floodplain delineations and watershed analyses basewide. Through appropriate hydrographic modeling, determine the various flood event levels for selected areas on Base. [Also applies to Section 4.2.1.] *

4.3.2 Isolated Ephemeral Wetlands/Vernal Pool Management

A number of areas at Camp Pendleton contain a wetland habitat known as isolated ephemeral wetlands. These isolated ephemeral wetlands occur naturally on hummocky soils with impervious subsurface layers, in swales between “mima mounds,” or in other depressions that impound water. Water ponds in these depressions in the winter and spring, and dries

later in the year. Specialized plant and animal species adapted to the seasonal wet and dry cycle thrive in many isolated ephemeral wetlands, including a number of sensitive plant and wildlife species, four of which are federally listed: spreading navarretia (*Navarretia fossalis*), San Diego button-celery (*Eryngium aristulatum* var. *parishii*), Riverside fairy shrimp (*Streptocephalus woottoni*), and San Diego fairy Shrimp (*Branchinecta sandiegoensis*). Vernal pools are a type of isolated ephemeral wetlands and are differentiated from other isolated ephemeral wetlands by their assemblage of floral species.

Currently, Camp Pendleton has completed two basewide inventories of isolated ephemeral wetlands (including vernal pools) and is in consultation with the USFWS for the management of the four listed species that are associated with vernal pools (in the Uplands Biological Assessment).

Management initiatives proposed within the Biological Assessment of Upland Habitats (currently under consultation with the USFWS) focus on the listed species and occupied pools. However, isolated ephemeral wetlands and vernal pools in general (including unoccupied pools) are expected to benefit from the proposed management for minimizing or avoiding the potential impacts from programmatic activities on Base. The Biological Assessment of Upland Habitats has a proposed system of "management levels" that addresses the impacts from training and related activities. Training areas on Base are either designated as Management Level 1 or Management Level 2. Training is permissible in both Management Levels; however, Management Level 2 areas have enhanced programmatic instructions intended to provide a higher level of avoidance and minimization of environmental impacts by personnel training on the Base.

Fifty percent of all known locations of pools (including isolated ephemeral wetlands and vernal pools) occur within the more protective Management Level 2 areas on Base. Moreover, according to the habitat quality classification system developed within the Isolated Ephemeral Wetlands Management Plan, the pools proposed for inclusion within Management Level 2 areas tend to be all of higher quality than the pools within Management Level 1 areas. Habitat quality for the classification system was assessed in terms of level of disturbance, soil profiles, and plant species diversity. The pool class scale ranges between 1 (high quality habitat) and 4 (low quality habitat). All Class 1 pools and 85% of Class 2 pools on Base are proposed for inclusion in the more protected Management Level 2 areas. Of the Class 3 and Class 4 pools, 46% and 42% respectively, are proposed for inclusion in Management Level 2 areas.

Wetlands in general and all pools occupied with listed species (in both Management Levels) receive protection from nontraining activities on Base through the use of programmatic instructions to avoid and minimize adverse impacts. A permanent project impact to occupied pools or jurisdictional wetlands requires mitigation. Projects that have the potential to impact vernal pools are evaluated on a watershed scale. As proposed within the Biological Assessment of Upland Habitats, Camp Pendleton is committed to maintaining free from permanent impact a percentage of the pools currently occupied by listed species as a commitment and contribution to regional recovery efforts. This regional commitment includes 25% of the pools currently occupied with San Diego fairy shrimp, 70% of the pools

with Riverside fairy shrimp, 75% of the pools with the San Diego button celery, and 78% of the pools with spreading navarretia.

OBJECTIVE: Protect the natural and beneficial functions of the Camp Pendleton's isolated ephemeral wetlands, including vernal pools. Take proactive action to prevent damage to vernal pools.

Priority Planned Actions:

- Maintain high quality and up-to-date GIS mapping of vernal pools on Camp Pendleton that support proactive planning and avoidance of impact. Ongoing. [Also applies to Section 4.2.1.]

- Continue to develop a GIS wetlands mapping coverage for Camp Pendleton that supports proactive planning and impact avoidance. Ongoing. [Also applies to Sections 4.2.1; 4.3.1, first objective.]

- Use various media to create and maintain awareness of Base personnel, general public, and lease and easement holders of the sensitivity, values, and obligations regarding the conservation of vernal pools and their watersheds. This includes presentations, briefs, newspaper articles, special messages, informational brochures, and interpretive signs. Ongoing. [Also applies to Section 4.5.1.]

- Place new field markers, signs, or fencing around vernal pool groups with a high susceptibility for damage to prevent accidental and/or unintentional damage. Ongoing.

- Work continuously with project and activity planners to avoid or minimize impacts to vernal pools early in the planning process. Ongoing.

- Replace deteriorated field markers, signs, or fencing around vernal pool groups with a higher susceptibility for damage to prevent accidental and/or unintentional damage every other year. 2002, 2004.

- Ensure that the Range and Training Regulations (Base Order P3500.1_), when revised, contain information and programmatic instructions to minimize damage to vernal pools by units training on the Base. 2003, 2005.

- Upon receipt from the USFWS, develop and implement the commitments and required elements contained within the Upland Biological Opinion. TBD. [Also applies to Section 4.5.1.]

Other Planned Actions:

- Design and develop a permanent vernal pool public education and interpretive display for public education on Base. ***

- Identify potential impacts that lessee and right-of-way holder activities could have to vernal pools and other resources. **

- Map other isolated ephemeral wetlands, and fully map watersheds of vernal pools and isolated ephemeral wetlands. *

4.3.3 Estuary/Coastal Zone Management

The management of estuary/coastal zone areas on Base is presented in the Estuarine/Beach Ecosystem Conservation Plan (Appendix D) and the Riparian BO (USFWS 1995a). The Estuarine/Beach Ecosystem Conservation program is designed to sustain and enhance estuarine and beach ecosystem dynamics to ensure that estuarine and beach communities on Camp Pendleton are sufficiently resilient to withstand natural and human disturbances including military training activities. This includes (1) conservation of listed species and their associated habitats and (2) maintaining and enhancing the functionality and biodiversity of the Santa Margarita River Estuary and the coastal lagoons located at Cockleburr, French, Hidden, Aliso, Las Flores, San Onofre, and San Mateo Creeks. Conservation efforts are being accomplished through active management efforts (e.g., protective fencing, warning signs, predator management, exotic vegetation control, monitoring of estuary salinity and tidal conditions) and through application of the programmatic instructions to facilitate avoidance and minimization of impacts within the land areas designated as management zones. Funding for future enhancement activities listed under the conservation recommendations, terms and conditions, and reasonable and prudent measures of the Riparian BO (USFWS 1995a) are being actively pursued to promote recovery of the appropriate species. Management proscriptions emphasize avoiding locating projects in estuary and beach areas to avoid permanent impacts from construction.

Base operations, activities, projects, and programs that affect the land, water, or natural resources of any coastal zone must be consistent, to the maximum extent practicable, with the policies of California's coastal zone management program. The Base supports the development and implementation of state coastal nonpoint pollution control programs on Marine Corps lands by identifying nonpoint sources, specifying corrective measures, and coordinating nonpoint source compliance efforts with state programs (HQMC 1998). Camp Pendleton has identified areas of sensitive natural resources of the coastal zone, minimized the loss or degradation of coastal wetlands, enhanced the natural value of wetlands, and protected water quality.

The effectiveness of Camp Pendleton's estuary/coastal zone management program will be determined through periodic measuring and monitoring of species population, habitat quantity and habitat values and comparing those values against goals and commitments

established (in consultation with the USFWS) in the Estuarine and Beach Ecosystem Conservation Plan (Appendix D).

An important component of estuary/coastal zone management is the issue sea cliff, canyon, and coastal terrace erosion. A study by Khun (1999) that addresses this subject is discussed within Section 4.7.2.

OBJECTIVE: Protect and rehabilitate the natural and beneficial functions of the Base's estuaries and coastal zones. Continue to implement the Estuarine/Beach Ecosystem Conservation Plan, as specified in the Riparian BO issued by the USFWS (1995a).

Priority Planned Actions:

- Continue to monitor tide levels and water quality in the Santa Margarita River; evaluate potential changes to the estuarine ecosystem as a result of ongoing watershed actions and projects and document the periods when the other coastal lagoons are subject to tidal influence. Ongoing. [Also applies to Sections 4.2.3; 4.7.1, sixth objective.] [Compliance requirement of Riparian BO (T&C, Appx 4, p. 2)]

- Monitor the effects of sedimentation in the Santa Margarita River Estuary and coastal lagoons that are subject to upstream disturbance from programmatic, construction activities, and off Base activities. Ongoing. [Also applies to Sections 4.7.1, sixth objective; 4.7.2, first objective.] [Compliance requirement of Riparian BO (Appx 4, p.2)]

- Continue to implement programmatic instructions for activities in and adjacent to riparian and estuarine/beach habitats. Ongoing. [Also applies to Section 4.3.4.] [Compliance requirement of Riparian BO (Reason & Prud meas, p. 31-32; Appx 5 in general)]

- Obtain concurrence from the USFWS that impacts are adequately offset by the Riparian and Estuarine/Beach Ecosystem Conservation Plans for any activity not specifically addressed in the programmatic instructions of the plan or otherwise covered in the Riparian BO. Ongoing. [Also applies to Section 4.3.4.] [Compliance requirement of Riparian BO (T&Cs 1b & 2b, pp. 33-34)]

- Rehabilitate estuarine/beach areas temporarily disturbed due to nonroutine maintenance and construction activities to original or better condition. Ongoing. [Compliance requirement of Riparian BO (T&C, p. 33; Appx 5, p. 3)]

- Ensure all beach managers and lifeguards receive training with regard to the implementation and enforcement of environmental laws and regulations. Ongoing. [Also applies to Section 5.3.2.]

- Develop a habitat enhancement plan for the San Onofre estuary. 2003.

Other Planned Actions:

- Restore and enhance coastal dunes. [Also applies to Section 4.7.2, first and second objectives.] ***

- Develop specific habitat enhancement plans for estuaries other than the San Onofre estuary. ***

- Monitor sediment load and model sediment transport in the Santa Margarita River mainstem and the estuary. ***

- Reduce encroaching bluff erosion. Submit specific projects through normal Base staffing procedures and the Base NEPA process for decision and approval. [Also applies to Section 4.7.2, first and second objectives.] **

- Evaluate the level of unauthorized recreational usage of the beach and the potential impacts. If needed, develop possible solutions. [Also applies to Section 5.3.2.] *

- Limit expansion of waterfront activities at all MCCS beaches and focus efforts towards improving existing programs and facilities. [Also applies to Section 5.3.2.] *

- Develop a master plan for recreational and other land uses of San Onofre Beach. [Also applies to Section 5.3.2.] *

4.3.4 Riparian Habitat Management

Riparian habitat management is accomplished through implementation of the Riparian Ecosystem Conservation Plan (Appendix E) and the Riparian BO (USFWS 1995a). The Riparian Ecosystem Conservation Plan is designed to maintain and enhance the biological diversity of the riparian ecosystem on Camp Pendleton. The conceptual approach behind this conservation plan is to sustain and restore riparian ecosystem dynamics so that natural plant and animal communities on the Base are sufficiently resilient to coexist with current and future military training activities. The success of this plan is primarily measured by the species richness and an increase in ecosystem health and value.

The plan identifies the major riparian habitats and quantifies the baseline (as present in 1994) acreage for each. The plan also assigns values to habitat types based on their suitability for current threatened and endangered species. These values were qualitatively developed based on information related to the distribution and abundance of threatened and endangered species and what was then known about their life history requirements. The riparian plan is a commitment to promote an increase in the quantity of riparian woodland and riparian scrub habitat throughout all the Base's watersheds, beyond the baseline established in the Santa Margarita River Memorandum of Understanding. Further, it promotes the maintenance of the open water/gravel areas and marsh areas within the baseline. Conservation efforts are

focused on the eradication of exotics for various habitat categories and conversion of this acreage to riparian woodland riparian scrub or open gravel areas in pursuit of the goal of promoting growth in threatened and endangered species (primarily least Bell's vireo [*Vireo bellii pusillus*], southwestern willow flycatcher [*Empidonax traillii extimus*], and arroyo toad [*Bufo californicus*]) populations.

The effectiveness of Camp Pendleton's riparian habitat management will be determined through periodic measuring and monitoring of species population, habitat quantity and habitat values and comparing those values against goals and commitments established (in consultation with the USFWS) in the Riparian Ecosystem Conservation Plan (Appendix E).

OBJECTIVE: Continue to implement the Riparian Ecosystem Conservation Plan, as specified in the Riparian BO issued by the USFWS (1995a).

Priority Planned Actions:

- Continue to implement programmatic instructions for activities in and adjacent to riparian and estuarine/beach habitats. Ongoing. [Also applies to Section 4.3.3.] [Compliance requirement of Riparian BO (Reason & Prud meas, p. 31-32; Appx 5 in general)]

- Obtain concurrence from the USFWS that impacts are adequately offset by the Riparian and Estuarine/Beach Ecosystem Conservation Plans for any activity not specifically addressed in the programmatic instructions of the plan or otherwise covered in the Riparian BO. Ongoing. [Also applies to Section 4.3.3.] [Compliance requirement of Riparian BO (T&Cs 1b & 2b, pp. 33-34)]

- Develop and implement mitigation measures for future proposed training and maintenance actions (that are not addressed in the Riparian BO) that may affect listed species or riparian habitat. Ongoing. [Compliance requirement of Riparian BO (T&C, p. 33)]

- Rehabilitate riparian areas temporarily disturbed due to nonroutine maintenance and construction activities to original or better condition. Ongoing. [Compliance requirement of Riparian BO (T&C, p. 33; Appx 5, p. 3)]

- Track plant community distribution, habitat function and value, and vegetation age classes. Ongoing. [Also applies to Sections 4.2.1; 4.3.1, first objective.] [Compliance requirement of Riparian BO (T&C, Appx 4, p.1)]

- Reduce or eradicate exotic vegetation from riparian areas and temporarily disturbed sites on Camp Pendleton in accordance with the Riparian Ecosystem Conservation Plan and the Riparian BO. Ongoing. [Also applies to Section 4.6.1.] [Compliance requirement of Riparian BO (T&C, p. 33; Appx 5, p. 3)]

- Conduct high-resolution aerial photography of the riparian and estuarine areas on Camp Pendleton every two years. 2002, 2004, 2006. [Also applies to Sections 4.2.1; 4.3.1, first objective.] [Compliance requirement of Riparian BO (Recom p. 39; T&C, Appx 4, p. 1; T&C, Appx 5, p. 4)]

Other Planned Action:

- Implement an effective dust control program to help minimize fugitive dust and sedimentation problems. [Compliance requirement of Riparian BO (T&C, Appx 5, pp. 2,3)] *

4.4 WILDLIFE MANAGEMENT

Fish and wildlife management is defined by the Marine Corps as "A coordinated program of actions designed to preserve, enhance, and regulate indigenous wildlife and its habitats, including the conservation of protected species and nongame species, management and harvest of game species, reduction in bird aircraft strike hazard (BASH), and animal damage control" (HQMC 1998). It is the Marine Corps policy that installations must comply with laws for the protection and management of wildlife resources and must develop, where compatible with military requirements, programs for the development, enhancement, and use of wildlife resources.

Topics included in this section are general wildlife management, migratory bird management, wildlife damage management (including BASH), integrated pest management, and game species and sport fisheries management. Pest management is included as it has potential effects on fish and wildlife, particularly with the application of pesticides. Federally listed species management and the exotics control program are addressed separately in following sections. Legislation and regulations relevant to fish and wildlife management are summarized in Appendix B.

GOAL: Incorporate ecosystem and adaptive management into management programs to conserve and enhance native fauna and the functional value of natural systems.

GOAL: To better understand natural processes and impacts, use monitoring, investigative research, and data analysis to make informed decisions necessary for maintaining training lands.

GOAL: Maintain viable populations of sensitive animal species and species that are indicators if important habitat or habitat health.

GOAL: Maintain functional wildlife corridors and habitat linkages between critical biological resource areas.

4.4.1 General Wildlife Management

All species of wildlife benefit from Camp Pendleton's basic strategy to maintain training areas in a natural state in support of training, reduce adverse impacts from activities, minimize development, and perform mitigation actions where impacts occur to threatened or endangered species, vernal pools, and other wetlands. The protection (via enhanced programmatic instructions) of riparian and estuarine/beach habitats and Management Level 2 areas (as proposed within the Biological Assessment of Upland Habitats) is ostensibly for federally listed species; however, numerous non listed, native species also benefit from these areas of reduced impacts. Indirectly, other proactive resource management initiatives, such as vegetation enhancement, will help protect the viability of wildlife populations on Camp Pendleton.

The basis of good management is understanding the diversity, abundance, distribution, population dynamics, and habitat requirements of species. While not feasible to survey and monitor all wildlife populations on Base, some species, such as federally listed species, help to provide indicators of ecosystem health in general. Moreover, the Base continues to conduct, or support others in conducting, studies that help managers to better understand the diversity and distribution of wildlife resources on Base. These studies have included monitoring neotropical migrant birds, arthropod surveys, lepidoptera surveys, bat surveys, herpetological surveys, and mule deer surveys.

OBJECTIVE: Manage existing native sensitive and nongame fish and wildlife species in order to support and maintain self-sustaining populations.

Priority Planned Actions:

- Provide focused training to the natural resources staff members responsible for wildlife management. Ongoing.

- Continue to study the effects of aircraft noise on passerines. Ongoing until 2006. [Also applies to Sections 4.4.2, second objective; 4.5.3.] [Compliance requirements of BRAC BO]

- In collaboration with Camp Pendleton land users, federal, state, tribal, local governments, nongovernmental organizations, private organizations, and the public, develop a shared vision of what constitutes desirable future ecosystem conditions. 2003. [Also applies to Sections 4.1.1, first objective; 4.1.2, first objective.]

- Identify controlled burn or other brush management areas that will be valuable for maintaining or enhancing mosaic and diversity of vegetative age classes and enhance wildlife diversity. This will compliment the Camp Pendleton Wildland Fire Management Plans and Uplands Ecosystem Conservation Plan. 2004. [Also applies to Section 4.11.1.]

Other Planned Action:

- Establish a wildlife population trend monitoring program for existing native sensitive and nongame fish and wildlife species as a component of long term ecological trend monitoring. [Also applies to Section 4.2.2, second and third objectives.] ***

4.4.2 Migratory Bird Management

Camp Pendleton provides habitats and open space for a wide variety of migratory birds that migrate annually within and beyond North America. Regardless of how birds use Camp Pendleton, their presence provides important ecological services and an important indicator of ecosystem health. Primary considerations with regard to migratory bird management are compliance with the Migratory Bird Treaty Act (MBTA); implantation of migratory bird management actions in accordance with EO 13186; and support, contribution, and compatibility with the goals and efforts of numerous regional migratory and game bird conservation programs.

The MBTA is an international agreement between the United States, Canada, and Mexico that protects designated species of birds. Virtually all birds that occupy Camp Pendleton throughout the year are protected under the act. The MBTA controls many actions that may negatively affect migratory birds, particularly collection and transport of birds. Special purpose permits may be requested and issued that allow for the relocation or transport of migratory birds for management purposes.

Executive Order 13186 was issued on 10 January 2001 and requires federal agencies taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement, within 2 years, a MOU with the USFWS. The Secretary of the Navy is developing the MOU that pertains to Navy and Marine Corps operations and installations. When completed, the protocols, guidance and responsibilities regarding protection of migratory birds developed in the MOU will be included in Camp Pendleton management programs and this INRMP.

Comprehensive bird conservation plans for nongame birds have recently been developed for landbirds, shorebirds, and colonial waterbirds. These plans identify species and habitat conservation priorities at the national and more detailed regional scale. The Pacific Flyway and North American Waterfowl Management Plans provide comparable conservation priorities, goals, and objectives for various waterfowl species and habitats within the Pacific Flyway. (USFWS Memo July 31, 2001).

Plans that encompass the west coast and southern California and have some level of applicability to Camp Pendleton include: USFWS Nongame Birds of Management Concern – The 1995 List; California Partners in Flight (CPIF) Draft Coastal Scrub and Chaparral Bird Conservation Plan; CPIF Oak Woodland Bird Conservation Plan; CPIF Riparian Bird Conservation Plan; CPIF Draft Grassland Bird Conservation Plan; The U.S. Shorebird Conservation Plan; The North American Waterbird Conservation Plan; and the Pacific

Flyway and North American Waterfowl Management Plans. While these regional conservation plans focus on various sets of migratory birds, and provide specific recommendations and goals for individual species, they have several goals, recommendations and objectives in common with each other and with Camp Pendleton's current and proposed natural resource management plans.

In addition to providing specific population goals and recommendations for individual species, the above plans identify several common conservation themes and objectives for the protection and conservation of migratory birds. Where these conservation plans establish priorities, goals, objectives and recommendations at the physiographic, regional, and national scale those priorities, goals, objectives and recommendations may be more appropriately addressed in the MOU being developed between the DoN and the USFWS (required by EO 13186) since they cover areas and issues that go beyond an individual installation. With regards to priorities, goals, objectives, and recommendations that support migratory birds at the local level Camp Pendleton has supported and continues to support projects that address migratory bird species, and the general ecosystem/habitat goals of these plans. Below are conservation objectives identified in the migratory bird conservation plans and a brief description of past and on going Base programs that contribute to these programs.

- Maintaining connectivity between habitat patches uses by migratory birds. Camp Pendleton's large contiguous area of open space provides few restrictions to migratory movement. The Base is currently following the development of regional conservation plans covering areas adjacent to Camp Pendleton to see how these plans establish preserves and corridor links to the Base and other habitats usable by migratory birds.

- Limiting disturbance events, such as prescribed burns, grazing, disking, and herbicide applications, to non-breeding seasons. Camp Pendleton's existing and proposed conservation plans limit activities that may disturb habitat during the breeding season, while Base Order P3500.1K (*Range and Training Regulations)* provides additional protection to bird habitats on Base *year round* through programmatic instructions that limit impacts to existing vegetation. Pest management is coordinated to limit impacts to natural resources.

- Control brown-headed cowbirds and conditions that attract them; control and eradicate nonnative plant species at the watershed/landscape scale and control and eradicate nonnative animal species, including mammalian predators. Detailed information on Camp Pendleton's long established programs to control and eradicate nonnative plant and animal species including cowbirds and invasive plants is covered in Section 4.6. All bird species that are impacted by cowbirds are provided some level of benefit by Camp Pendleton's effort to control cowbirds. Programmatic instructions and housing regulations preclude residents in some areas near sensitive species from having household pets that may prey on migratory birds, including federally listed threatened and endangered species.

- Take actions to minimize the deleterious effects of future development and preserve and protect habitat and the establishment on priorities for protection and restoration.

Camp Pendleton's intends to keep over 85% of its land as open space and to limit development, to the maximum extent practicable, to existing cantonment areas. This development goal supports bird conservation plans that focus on ensuring patch sizes, configuration, connectivity, and diversity of habitats and the minimization of effects of development.

- Develop methodologies and provide data on pressing conservation issues affecting birds, through use of long term monitoring, standardized monitoring protocols, data collection on multiple species during specialized monitoring, and data gathering on species of concern. Camp Pendleton uses standardized monitoring techniques, coordinated with the USFWS when monitoring and conducting population counts. The Base is following the development of habitat conservation plans in adjoining communities to identify proposed monitoring protocols and supports the development of standardized data collection protocols so that results are comparable across space and time.

  The Base also supports DoD's policy for integrating neotropical migratory bird management into existing natural resource and land management programs consistent with the military mission. In support of that policy Camp Pendleton participates in the international Partners in Flight (PIF) program, through the establishment and maintenance of Monitoring Avian Productivity and Survivorship (MAPS) stations. The PIF program consists of a network of federal, state, and nongovernmental organizations that promote bird conservation and research, and DoD is an important participant. The MAPS program provides an integrated bird monitoring system for North America by collecting a wide variety of physical and demographic data on migrant and resident birds at these stations. Data collected from all MAPS stations may be used to identify regional and national population trends.

- Manage vegetation communities to create soft edges appropriate to historical vegetation patterns; manage habitats for diversity and natural conditions; ensure that patch sizes, configuration, and connectivity of habitats support desired populations; and increase size and diversity of habitats. Camp Pendleton's ecosystem management approach is based on the concept of maintaining natural systems that support diversity and restore/maintain natural conditions. Where goals, objectives, and recommend-ations of conservation plans focus on the management of the needs of select focal or secondary species, Camp Pendleton will review those specific requirements to see how they correspond to the Base's other natural resource management goals and requirements.

- Increase communication and coordination between land managers and specialists. Camp Pendleton participates in several regional coordination and informational exchange groups and participates in the development of local regional plans. Final results from surveys conducted on Base are made available to any interested party. Additionally, the publishing of this document will make available to agencies and the public detailed information on Camp Pendleton's programs and natural resources.

OBJECTIVE: Implement MBTA conservation requirements in a manner consistent with military mission requirements.

Priority Planned Actions:

- Maintain the Base's Special Purpose Migratory Bird Permit to move and relocate birds for the purposes of transporting to a wildlife care facility, accommodate mission critical requirements, or otherwise care for the safety of migratory birds, their young, eggs, or nests. Ongoing. [Also applies to Section 4.4.3, first objective.]

- Develop contractual and work order language for contracts and work orders relating to construction, reconstruction, and maintenance projects on the Base to minimize loss of bird nests and costly delays due to MBTA prohibitions. 2002. [Also applies to Section 4.4.3, first objective.]

- Develop protocols, including tracking and reporting, for responding to injured or nuisance birds including active bird nests (with or without eggs or chicks). 2002. [Also applies to Section 4.4.3, first objective.]

- Establish guidelines for installation of exclusion devices in areas where bird access or nesting cause problems. 2003.

- Annually conduct and track (inventory) animal damage control, predator management, and cowbird control activities on Base. Ongoing. [Also applies to Sections 4.2.2, third objective; 4.4.3, first objective; 4.6.2.] [Compliance requirement of Riparian BO (Appx 4, p. 2)]

Other Planned Action:

- Undertake measures to assess threats to the survival and recovery of avian species on Base, including the severity of threats posed by likely predators/competitors. [Also applies to Sections 4.4.2, second objective; 4.5.4.] *

OBJECTIVE: Support regional migratory bird conservation plans' goals, objectives, and recommendations in a manner consistent with military mission requirements.

Priority Planned Actions:

- Encourage establishment of restoration sites near existing high quality sites and population sources to provide a higher probability of being recolonized by locally extirpated species. Ongoing.

- Utilize, to the extent practicable, restoration recommendations from the various migratory bird conservation plans when developing restoration plans. Ongoing

- Utilize recommendations from the various migratory bird conservation plans to help develop research projects. Ongoing.

- Sponsor/support scientific research in support of regional understanding and management goals by qualified personnel. Ongoing. [Also applies to Sections 4.1.2, second objective; 4.2.2, third objective.]

- Develop a monitoring program for wildlife species of regional concern with a specific focus on those species likely to become proposed for listing as threatened or endangered in the near future. 2002. [Also applies to Sections 4.2.2, second objective; 4.5.2, second objective.]

- Participate in Annual Christmas Bird Count on MCAS to compile data on what birds are winter residents on MCAS. Ongoing. [Also applies to Section 4.2.2, third objective.]

- Conduct Spring Bird Count on MCAS to provide a comprehensive record on the numbers of birds at the Station during the spring. Ongoing. [Also applies to Section 4.2.2, third objective.]

- Obtain Audubon Society bird data collected on Camp Pendleton. 2003. [Also applies to Section 4.2.2, third objective.]

- Develop GIS layers of comparable datasets that allow for spatial and temporal change detection in populations of selected species and sensitive habitat types. Ongoing. [also applies to Section 4.2.3.]

- Continue to study the effects of aircraft noise on passerines. Ongoing until 2006. [Also applies to Sections 4.4.1; 4.5.3.] [Compliance requirements of BRAC BO]

- Per the Riparian Ecosystem Conservation Plan and its Biological Opinion, conduct brown-headed cowbird trapping to reduce nest parasitism from this exotic species and to help increase the reproductive success of native bird species. Ongoing. [Also applies to Section 4.6.2.]

Other Planned Actions

- Continue MAPS stations. Study the use of certain habitats by neotropical migratory birds in conjunction with the DoD Partners in Flight program. ***

- Continue to evaluate the status of raptor populations and reproduction on Camp Pendleton. [Also applies to Section 4.2.2, second and third objective.] **

- Obtain additional data on species identified as focus species or species of concern in migratory bird conservation plans. *

- Develop data required to support the goals, objectives, and recommendations of Executive Order 13186. *

- Undertake measures to assess threats to the survival and recovery of avian species on Base, including the severity of threats posed by likely predators/competitors. [Also applies to Sections 4.4.2, first objective; 4.5.4.] *

4.4.3 Wildlife Damage Management (Including Bird Aircraft Strike Hazard)

Camp Pendleton's boundaries interface with both urban and natural environments. Conflicts can arise with nuisance animals (coyotes, ground squirrels, skunks, and rats), which occasionally pose a health or safety hazard. Further, federally listed threatened and endangered species, and other native wildlife can become prey for domestic animals, including pets and feral animals. Camp Pendleton's pest control is through the Facilities Maintenance Division and, if necessary, other local vector/animal control agencies. Wildlife problems previously identified at Camp Pendleton include coyotes around housing areas, bats roosting in buildings, gulls and crows at the landfill, and interference from bird flocks on the runway. Assistance with nuisance animal problems is obtained from the U.S. Department of Agriculture Wildlife Services on a reimbursable basis. All wildlife damage management and control measures on Base are conducted in a humane and judicious manner. To minimize problems from domestic animals and the potential escape and establishment of exotics, the Base has a policy on the possession of pets (most exotic pets are prohibited basewide and some housing areas adjacent to sensitive resources have restrictions on the possession of normal domestic household pets, such as dogs and cats).

Bird collisions with aircraft are a serious threat to flight safety. At MCAS, the problem has been largely with flocking species such as crows, blackbirds, and gulls. Distribution and abundance of bird species that pose a potential hazard can change seasonally and also vary by altitude, temperature, rainfall patterns, and surrounding land use. Several methods are being researched and considered for usage in the MCAS BASH Plan including, but not limited to, the following:

- Bioacoustics. Bioacoustics is taped distress or alarm calls of birds. The equipment required to adequately project these calls includes a cassette tape deck mounted in a vehicle and a speaker mounted on its roof. Special care must be taken to play the tape in short intervals to prevent habituation by the birds. Play the tape for 20 to 30 seconds and then pause briefly. Repeat the procedure several times if necessary. The birds should respond by taking flight or becoming alert/wary. These calls are effective for gulls, blackbirds, starlings, cowbirds, grackles, ravens, crows and some shorebirds. Pyrotechnics could be used in conjunction with bioacoustics to enhance dispersal.

- Pyrotechnics. Pyrotechnics are 12-gauge scare cartridges that produce a secondary explosion to scare the birds from the area. The scare cartridges are launched from either a shotgun or pyrotechnic pistol (M-8 Very Pistol) with a steel sleeve insert to modify the gun to the 12-gauge size. Pyrotechnics have proven effective in dispersing most bird species.

- Propane Gas Cannons. These devices should be operated, especially at dawn and dusk, as birds come into feed and roost. Cannons must be relocated frequently to avoid habituation problems. These devices have been quite effective on gulls, blackbirds and waterfowl.

- Depredation. Birds must be killed occasionally as a reinforcement of other methods. Domestic pigeons and rock doves, European starlings, and house sparrows may be killed without a permit. However, A federal depredation permit, available from the USFWS, is required before killing any birds protected under the MBTA.

- Falconry. Falcons trained for airfield bird dispersal may be effective when used in combination with other frightening techniques and has been quite successful with blackbirds, pigeons and gulls.

- Model Airplanes. The model airplane method uses a radio remote controlled model airplane to disperse birds. The wingspan is approximately 42 inches and is equipped with a wind-powered, noise generator, attached to a wing surface. It has proven effective with large shore birds, waterfowl and wintering vultures.

- Border Collie. The use of Border Collie dogs to disperse birds has proven effective under certain circumstances.

- Fogging. A technique that utilizes a device that resembles types of smoke that effects birds.

Ineffective Methods of Control:

- Stuffed owls and rubber snakes advertised to rid hangars and buildings of birds are usually a waste of money and effort.

- Rotating lights have brought conflicting results, but are generally considered ineffective. Birds quickly habituate to these devices, and the problem remains unsolved.

- Eyespots on aircraft components are being studied in the U.S. and abroad. However, early results suggest the addition of eyespots does not significantly reduce the BASH potential.

- Ultrasonic devices are also not considered effective.

OBJECTIVE: Protect the Base, its inhabitants, and native species from damage or loss due to wild or feral animal predation.

Priority Planned Actions:

- Maintain the Base's Special Purpose Migratory Bird Permit to move and relocate birds for the purposes of transporting to a wildlife care facility, accommodate mission critical requirements, or otherwise care for the safety of migratory birds, their young, eggs, or nests. Ongoing. [Also applies to Section 4.4.2, first objective.]

- Annually conduct and track (inventory) animal damage control, predator management, and cowbird control activities on Base. Ongoing. [Also applies to Section 4.2.2, third objective; 4.4.2, first objective; 4.6.2.] [Compliance requirement of Riparian BO (Appx 4, p. 2)]

- Maintain a contract with wildlife rehabilitation centers for placement of injured or abandoned wildlife. Ongoing.

- Develop contractual and work order language for contracts and work orders relating to construction, reconstruction, and maintenance projects on the Base to minimize loss of bird nests and costly delays due to MBTA prohibitions. 2002. [Also applies to Section 4.4.2, first objective.]

- Develop protocols, including tracking and reporting, for responding to injured or nuisance birds including active bird nests (with or without eggs or chicks). 2002. [Also applies to Section 4.4.2, first objective.]

- Re-publish Standard Operating Procedures for responding to and handling injured, dead, nuisance, or otherwise encountered wildlife. 2004.

- Publicize the problems with feeding wild animals and actively discourage this activity. 2004.

Other Planned Actions:

- Re-publish procedures for handling road killed/injured deer and other larger animals. **

- Establish informational/warning signs in areas with a history of human/animal conflicts. **

OBJECTIVE: Reduce the potential for bird collisions with aircraft.

Priority Planned Actions:

- Complete development of MCAS Bird Aircraft Strike Hazard (BASH) program. 2002.
- Implement the Bird Aircraft Strike Hazard Plan for MCAS. 2002.
- Complete assessment of bird roosting sites on and adjacent to MCAS. 2002.
- Collect data on the seasonality (e.g., flocking behavior) and observations of corvids, passerines, and other potential BASH species; coordinate observation efforts with Air Traffic Control personnel, pilots, safety personnel, and ground crew. 2002.
- Complete "bird-proofing" of MCAS hangars. 2003.

Other Planned Actions:

- Evaluate methods of species control for BASH program (e.g., use of falconry, trained dogs, etc.). [Also applies to Section 4.5.3.] **
- Evaluate the advantages and disadvantages of owls inhabiting hangers. *

4.4.4 Integrated Pest Management

The AC/S Facilities, Facilities Maintenance Division is responsible for pest (e.g., insects, rodents, weedy plants, and disease) management. The Camp Pendleton Pest Management Plan facilitates annual planning and approval of pest control measures. The Pest Management Plan stresses prevention, education. Toxic chemicals are used only as a last resort. Pesticide use in support of Base natural resources management activities complies with applicable requirements, including those of the Federal Insecticide, Fungicide, and Rodenticide Act. Integrated pest management also encompasses exotic plant/weed control (refer to Exotics Species Control).

An integrated Pest Management Plan is updated annually by AC/S Facilities FMD and reviewed by AC/S ES to ensure proposed pest management actions will not detrimentally impact natural resource programs and species recovery efforts.

OBJECTIVE: Comply with the Federal Insecticide, Fungicide, and Rodenticide Act keeping pesticide use to a minimum.

Priority Planned Actions:

- Submit Pest Management Plan to AC/S Environmental Security for review by hazardous waste and natural resource managers. Ongoing.

- Review Pest Management Plan annually to ensure that proposed pest management actions will not detrimentally impact natural resource management and species recovery programs. Ongoing.

OBJECTIVE: Maintain capability to respond to potential incidences of Africanized honeybee infestations.

Priority Planned Actions:

- Ensure that at least one member of the Resource Management Division staff is current on behavior, current distribution, and control techniques for managing Africanized honey bees. Ongoing.

- Maintain informational materials regarding Africanized honeybees. Ongoing.

- Maintain an Africanized Honeybee Response Plan. Ongoing.

4.4.5 Game and Sport Fisheries Management

In support of the recreational hunting and fishing programs on Camp Pendleton (Chapter 5), the Wildlife Management Branch of the Resources Management Division within AC/S Environmental Security is responsible for the management of game species on Base. The Base hunting and fishing programs are subject to applicable federal and state regulations and are managed cooperatively with the California Department of Fish and Game (CDFG). Under Sections 3450 – 3453 of the California Fish and Game Code, Camp Pendleton annually submits for approval the number of deer tags for distribution by both the Base and the State Fish and Game Commission.

While no native freshwater game fish species occur on Camp Pendleton, a few ponds and lakes have been historically managed for game fish as part of a recreational fishery program. Inland freshwater fishing is not currently authorized in rivers or creeks. Inland fishing may be authorized at Horseshoe Lake, Case Spring ponds, Santa Margarita River (above Stewart Mesa Road and in winter months only), Lake O'Neill, Whitman Pond, Pilgrim Creek Pond, Broodmare Ponds, Wildcat Ponds, Windmill Lake, and Las Flores Slough (from I-5 bridge west to the ocean) (see Chapter 5). Fishing is permitted at Pulgas Lake for catch and release only.

The Resources Enforcement/Compliance Branch stocks Lake O'Neill occasionally with exotic game fish, including largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis*

macrochirus), black crappie (*Pomoxis nigromaculatus*), and channel catfish (*Ictalurus punctatus*). Rainbow trout (*Salmo gairdnerii*) and red-eared sunfish (*Lepomis microlophus*) have previously been recorded as having been stocked on Camp Pendleton.

Wildlife game species at Camp Pendleton include California quail (*Callipepla californic*a), mourning dove (*Zenaida macrour*a), desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicu*s bennetti), brush rabbit (*Sylvilagus bachmani*), southern mule deer (*Odocoileus hemionus fuliginatus*), and several waterfowl species. Management practices benefiting game species on Base include providing additional water sources, controlled burns, brush management, food plantings, and population inventories.

Hunting and active management of the southern mule deer (*Odocoileus hemionus fuliginatus*) population at Camp Pendleton has been ongoing since at least 1955. To facilitate management of this species, the Base contracted Floyd W. Weckerly of Humboldt State University (Weckerly 1998) to analyze years worth of accumulated deer survey and hunting data, review the existing management plan, and develop a revised management plan to maintain sustained yield hunting on Base. Findings from that study indicated that the Camp Pendleton management program for the deer population is sound and effective. Additional recommendations were also provided.

OBJECTIVE: Provide quality and sustainable hunting and fishing by protecting and enhancing habitat for game species and managing populations near the optimal carrying capacity.

Priority Planned Actions:

- Continue to collect and analyze data from harvested animals to support informed fish and game management decisions. Ongoing.

- Annually review the Base hunting program to ensure that it remains sustainable and compatible with wildlife management goals. Ongoing.

- Conduct an annual fish and game survey to evaluate sustainable hunting and fishing levels. Ongoing.

- Develop a Game Management Plan for small game and upland game species (incorporating fisheries and deer management plans). 2003. [Also applies to Section 5.2.1.]

- Evaluate the feasibility and desirability of expanding inland/freshwater fishing opportunities to the general public. 2004. [Also applies to Sections 5.1.1; 5.2.2.]

- Develop a Fisheries Management Plan to address the adverse impacts to Camp Pendleton's fresh water lakes and ponds from siltation, stagnation, exotic species and aquatic plants. 2005. [Also applies to Sections 5.2.2.]

Other Planned Actions:

- Conduct a Comprehensive Freshwater Fisheries Management Study. [Also applies to Section 5.2.2.] ***

- Evaluate the efficacy of maintaining artificial sources of water availability for wildlife (via use of guzzlers and small earthen dams). *

- Assess the feasibility and desirability of expanding the hunting program to include additional or introduced species. If desirable and feasible, coordinate changes through normal Base staffing procedures and the Base NEPA processes. [Also applies to Section 5.2.1.] *

- Evaluate the feasibility and desirability of installing a low cost/maintenance water quality improvement system for Lake O'Neill. [Also applies to Section 5.2.2.] *

4.5 THREATENED AND ENDANGERED SPECIES MANAGEMENT

While the Base's natural resource management philosophy is that program initiatives should be ecosystem based, special attention is provided to threatened and endangered species and their habitats to prevent "jeopardy" and to assist in the conservation and recovery of those species. As such, the Base maintains habitats sufficient to sustain existing species populations while also allowing for potential growth. The Marine Corps recognizes the importance of maintaining natural landscapes, wherever possible, as a mission essential element in training and views effective conservation and management of natural resources as an integral component of the long term viability of the military training mission itself. To balance training mission with the protection of listed species and their habitats, the following guiding principles are key to Camp Pendleton's listed species management programs:

- The primary focus of avoidance and minimization of impacts to listed species will be on occupied habitat. Without a thorough understanding of the necessary components defining suitable habitat for a species, it is difficult to accurately predict locations of potential habitat.

- Should populations of threatened or endangered species increase in size and geographic area across the Base, there will not be a concomitant increase in restrictions to training or support activities. (Camp Pendleton's mission will not be penalized by good management practices that lead to an increase in listed upland species populations.)

- Habitat enhancement, restoration, and other efforts conducted as compensation for permanent and temporary impacts from ongoing Base activities will not further reduce the overall land available to training. (All compensation measures should be compatible with training in the long term.)

- Programmatic instructions will be the primary tool for facilitating avoidance and minimization of potentially adverse impacts to the environment in general and listed upland species in particular.

- Programmatic instructions should be unambiguous and simple, while being neither undesirably restrictive nor lenient. Complex management rules foster greater difficulty in enforcement and achieving compliance.

- Management programs provide incentives for avoiding permanent impacts to listed species occupied habitat and place limits on the amount of permanent impact that is allowable.

- A programmatic approach for processing/consulting on future construction projects (permanent impacts) will clearly define the required level of communication between the Base and the USFWS and make mitigation costs more predictable.

- Listed species management will be adaptive, incorporating knowledge gained over time and accommodating potential changes in natural resource and military training and mission support needs.

The primary legislation regulating actions that may directly or indirectly impact federally listed species is the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq*.). Camp Pendleton regularly consults with the USFWS to ensure that Marine Corps actions are not likely to jeopardize the continued existence of any endangered or threatened species and are within compliance with Sections 7 and 9 of the ESA. Pursuant to Section 7 of the ESA, federal agencies such as the Marine Corps must consult with USFWS if their action "may affect" a federally listed endangered or threatened species (50 CFR 402). Such consultations may be formal or informal. When necessary, Camp Pendleton prepares a biological assessment of the effects of a proposed action on listed species, as required by Section 7 of the ESA, which serves to conserve endangered and threatened species. Section 9 of the ESA prohibits the take of a threatened or endangered species. A take includes the direct killing, harming, or harassing of a species, or destruction of habitat that may be important for the species' survival or recovery.

Camp Pendleton’s management approach to federally listed threatened and endangered species is to implement measures to avoid and minimize adverse impacts; proactively collect information on presence or absence, location, habitat availability and suitability, and life history requirements; and compensate/mitigate for impacts that do occur. For some species and some locations on Base, habitat enhancement and restoration have been, and will continue to be, used as compensation/mitigation and to help meet management and recovery goals.

To ensure that ongoing and future military mission requirements (including training, support activities, maintenance, fire management, natural resource management, etc.) on Base are in compliance with the ESA, Camp Pendleton developed and consulted with the USFWS on conservation programs for federally listed species and their habitats on Base. In 1995, Camp Pendleton received a Biological Opinion from the USFWS (1995a) covering the Estuarine and Beach Ecosystem Conservation Plan (Appendix D) and the Riparian Ecosystem Conservation Plan (Appendix E). Appendix S contains the reasonable and prudent measures, terms and conditions, and conservation recommendations from the Riparian BO (USFWS 1995a). This Biological Opinion serves to ensure that actions funded, authorized, or carried out by the Base in the performance of its military training mandate do not jeopardize the continued existence of any listed or proposed species. Included in these conservation plans and concurred with by the Biological Opinion (1-6-95-F-02) are goals for species population size or habitat acreage that identify Camp Pendleton's conservation responsibility within ecoregion species recovery efforts (Table 4-1) and a habitat value system for riparian ecosystems on Camp Pendleton.

TABLE 4-1. Federally listed riparian and estuarine/beach species population goals.

Species	Goal
Least Bells Vireo	200 (territorial males)
Southwest Willow Flycatcher	20 (territorial males)
California Least Tern	[BO #1-6-95-F-02: Maintain the current population and promote its growth]
Western Snowy Plover	40 (breeding pairs)
Arroyo Southwestern Toad	Maintain Existing Habitat
Tidewater Goby	Maintain Existing Habitat

Currently, the Base is in consultation with the USFWS on the Biological Assessment of Upland Habitats on Camp Pendleton and the associated Listed Upland Species Management Program. The USFWS is expected to issue a Biological Opinion by the end of 2002. The Listed Upland Species Management Program will be added as Appendix F and Upland terms and conditions will be added as Appendix T once the Biological Opinion is issued.

As part of each conservation plan an Consultation Class System has been established that provides a programmatic approach for directing future consultations on permanent impact projects. The purpose of this programmatic approach is to: (1) satisfy Section 7(e)20 of the ESA requirements for future consultations; (2) provide a systematic method for dealing with future proposed projects in a consistent, predictable manner; (3) increase the Base's mission

flexibility; (4) identify activities which require formal consultation with the USFWS; and (5) reduce staff time.

The Consultation Class System does not negate requirements for consultation in the future. On the contrary, it is intended to clarify which projects require consultation and which are "programmatically" covered by programmatic management programs (and their respective Biological Opinions) and receive expedited implementation. The Consultation Class System has been established for riparian, estuarine and beach ecosystem and proposed (pending completion of formal Section 7 consultation) for uplands. The Consultation Class System establishes annual reporting procedure for newly initiated Base activities, the effects of which are relatively minor and easily covered under the conservation plan. Further, the system defines types of activities for which an expedited consultation process can be implemented.

Under the Consultation Class System, proposed activities are assigned to one of the following consultation class categories: I, II, III, or IV. The action required by Camp Pendleton and the USFWS for each consultation class category was established during formal Section 7 consultation on the management plans and is summarized in Table 4-2. Determination of consultation class level for a proposed project depends largely upon the timing, location, and size of the project relative to the species potentially impacted.

TABLE 4-2. Consultation class categories and action required.

Consultation Class	Action Required
I	Impacts not offset by program. Individual consultation required.
II	Impacts primarily offset by management plan. Concurrence letter from USFWS required for specific project.
III	Impacts completely offset by management plan. USFWS notified annually of Class III projects occurring during previous year.
IV	No impacts to listed species. No reporting required.

GOAL: Incorporate principles of ecosystem management into threatened and endangered species management.

GOAL: Maintain existing populations of federally listed species and survey for new populations and existing populations.

GOAL: Conserve and manage threatened and endangered species in accordance with all environmental laws and their implementing regulations.

GOAL: Conduct research on the population dynamics of threatened and endangered species in order to make recommendations that assist in their survival and recovery.

4.5.1 Avoidance/Minimization and Awareness

Central to the management of listed species on Base and key to each conservation plan is the avoidance and minimization of adverse impacts to those species and their habitats. While the Base cannot control natural population fluctuations, it can and does manage anthropogenic disturbance to listed species and their habitats. Thus, the general management approach on Base can be characterized as the "managing of impacts." As such, management programs are generally divided into two components, one for the management of impacts that are *temporary* (e.g., from ongoing activities such as training, maintenance, and recreation) and one for those that are *permanent* (e.g., from infrastructure development projects).

Ongoing military training and mission support activities create impacts that are generally temporary in nature and avoidance and minimization of these impacts are accomplished via programmatic instructions. Further discussion of the implementation and enforcement of these programmatic instructions is provided in Section 4.0.2.2. In addition to programmatic instructions, physical measures may be enacted to facilitate avoidance or minimization of impacts to sensitive resources, including fencing and relocation. For permanent projects, the NEPA process and Public Works Department site selection and approval process facilitate avoidance and minimization of adverse impacts (see Environmental Planning, Section 4.12). Additionally, the Consultation Class System, programmatic instructions, and pre-established mitigation, included in each ecosystem conservation plan, encourages avoidance and minimization through reduced project costs and efforts when listed species and their habitat are avoided.

OBJECTIVE: Implement avoidance and minimization measures in accordance with ESA Section 7 consultations.

Priority Planned Actions:

- Continue to publish in Base/Station Orders and other relevant documents measures necessary for compliance with the Riparian BO. Ongoing.

- Publish in Base Orders and other relevant documents measures necessary for compliance with the Upland Biological Opinion when completed by the USFWS. Ongoing.

- Every six months, update the Base's Environmental Operations Maps to include the most current species and natural resource data. Ongoing. [Also applies to Section 4.14.2, first objective.]

- Facilitate distribution of updated Environmental Operations Maps to Base users. Ongoing. [Also applies to Section 4.14.3.]

- Execute commitments, terms and conditions of all formal and informal consultation documents that apply on the Base to which the Marine Corps or another DoD agency agreed. Ongoing.

- Where possible and reasonable, adopt the least damaging alternative of proposed activities that have potential to result in the permanent loss of listed species habitats. Use the Activity/Consultation Class System to determine the required level of consultation with the USFWS for new projects. Ongoing. [Also applies to Section 4.5.4.] [Compliance requirement of Riparian BO (Appx 5, p. 4: implem Appx 1, p. 68)]

- Annually fence and post warning signs around the endangered least tern and snowy plover nesting areas in accordance with the Estuarine Ecosystem Conservation Plan. Ongoing. [Also applies to Section 4.5.4.] [Compliance requirement of Riparian BO (Appx 5, p. 6, implem Appx 1 mgmt plan)]

- Use various media to create and maintain awareness of Base personnel, general public, and lease and easement holders of the sensitivity, values, and obligations regarding the conservation of federally listed threatened and endangered species and their habitat. This includes presentations, briefs, newspaper articles, special messages, informational brochures, and interpretive signs. Ongoing. [Also applies to Section 4.3.2.]

- Train natural resources staff responsible for listed species management regarding species under their primary areas of responsibility on a regular basis. Ongoing.

- Where feasible, salvage federally listed and sensitive native plant species from new project construction sites for transplantation to suitable and more protected locations. Ongoing.

- Review and modify avoidance and minimization measures as additional information or specific results are obtained. Ongoing.

- Erect signage on MCAS to discourage unauthorized usage of sensitive habitats. 2002.

- Upon receipt from the USFWS, develop and implement the commitments and required elements contained within the Upland Biological Opinion. TBD. [Also applies to Section 4.3.2.]

4.5.2 Surveys and Monitoring

Federally listed threatened and endangered species within riparian and estuarine/beach habitats on Base are monitored at levels and frequency intervals specified within the Estuarine and Beach Ecosystem Conservation Plan (Appendix D), the Riparian Ecosystem Conservation Plan (Appendix E), and their Biological Opinion (USFWS 1995a). Listed upland species are also currently monitored; however, the level and frequency intervals for future monitoring are presently under consultation with the USFWS. Site specific surveys for listed species known to occur on Base are also conducted for individual projects where necessary. Surveys for selected listed species not presently known to occur on Base or for candidate species that may become listed are also conducted when funds and opportunities become available.

Surveys and monitoring are used to determine species populations, habitat levels, and habitat values that are used to help determine the effectiveness of Camp Pendleton's conservation and management programs.

OBJECTIVE: Maintain up-to-date distribution, population dynamic, and habitat data for all federally listed threatened and endangered species and species proposed to be listed as threatened or endangered that are *known to occur on Base*.

Priority Planned Actions:

- Monitor annually the threatened western snowy plover population and locations, providing estimates of the number of breeding individuals, reproductive success, distribution, abundance, and habitat. Ongoing. [Also applies to Section 4.2.2, first objective.] [Compliance requirement of Riparian BO (Appx 4, p. 2)]

- Monitor annually the endangered California least tern population, providing estimates of the number of breeding individuals and the reproductive success. Ongoing. [Also applies to Section 4.2.2, first objective.] [Compliance requirement of Riparian BO (Appx 4, p. 2)]

- Annually monitor the population and distribution of the endangered arroyo toad. Ongoing. [Also applies to Section 4.2.2, first objective.] [Compliance requirement of Riparian BO (Appx 5, p. 5)]

- Periodically conduct arroyo toad surveys of MCAS. Ongoing. [Also applies to Section 4.2.2, first objective.]

- Annually monitor the population levels and distributions of the endangered least Bell's vireo. Ongoing. [Also applies to Section 4.2.2, first objective.] [Compliance requirement of Riparian BO (Appx 4, p.2; 5, p. 5)]

- Annually monitor the population levels and distributions of the endangered southwestern willow flycatcher. Ongoing. [Also applies to Section 4.2.2, first objective.] [Compliance requirement of Riparian BO (Appx 4, p.2; 5, p. 5)]

- Annually monitor a portion of Base estuaries for the endangered tidewater goby population ensuring that each estuary is monitored at least every 3 years. Ongoing. [Also applies to Section 4.2.2, first objective.] [Compliance requirement of Riparian BO (Appx 4, p. 2 - every 3 yrs)]

- Incorporate project specific survey data for federally listed species into the GIS species distribution database. Ongoing. [Also applies to Section 4.2.2, first objective.]

- Incorporate U.S. Geological Survey and CDFG fish survey data into GIS species distribution database. 2003. [Also applies to Section 4.2.2, third objective.]

- Assess the feasibility and desirability of conducting off-Base surveys of selected species and habitat types, water quality monitoring, and hydrographical surveys to contribute to the understanding of Camp Pendleton's regional contribution to species and habitat conservation and recovery. 2003. [Also applies to Sections 4.1.2, second objective; 4.2.1, first objective; 4.2.2, first and second objectives; 4.5.2, second objective.]

- Monitor selected plots every other year for the endangered Pacific pocket mouse population. Conduct comprehensive surveys for the endangered Pacific pocket mouse at intervals determined in the Uplands Biological Opinion. TBD. [Also applies to Section 4.2.2, first objective.]

- Survey for the southern steelhead as determined in consultation with National Marine Fisheries Service. As needed, conduct genetic tests on a representative sample. TBD. [Also applies to Section 4.2.2, first objective.]

- Monitor and document changes in the population and distribution of the threatened California gnatcatcher at intervals to be determined in the Uplands Biological Opinion issued by the USFWS. TBD. [Also applies to Section 4.2.2, first objective.]

- Monitor and document changes in the population and distribution of the endangered Stephens' kangaroo rat at intervals to be determined in the Uplands Biological Opinion issued by the USFWS. TBD. [Also applies to Section 4.2.2, first objective.]

- Collect survey data on isolated ephemeral wetland invertebrates, including the endangered San Diego fairy shrimp and the Riverside fairy shrimp at levels and intervals to be determined in the Uplands Biological Opinion issued by the USFWS. TBD. [Also applies to Sections 4.2.2, first, second, and third objectives; 4.5.2 second objective.]

- Conduct surveys for the endangered San Diego button-celery at levels and intervals to be determined in the Uplands Biological Opinion issued by the USFWS. TBD. [Also applies to Section 4.2.2, first objective.]

- Conduct surveys for the threatened spreading navarretia at levels and intervals to be determined in the Uplands Biological Opinion issued by the USFWS. TBD. [Also applies to Section 4.2.2, first objective.]

- Conduct surveys for the thread-leaved brodiaea at levels and intervals to be determined in the Uplands Biological Opinion issued by the USFWS. TBD. [Also applies to Section 4.2.2, first objective.]

Other Planned Action:

- Facilitate annual light-footed clapper rail surveys on Base. [Also applies to Section 4.2.2, first objective.] [Compliance requirement of Riparian BO (Appx 1, p. 83)] ***

OBJECTIVE: Survey for species that are *not currently federally listed* but for which there may be a likelihood of becoming listed in the future.

Priority Planned Actions:

- Develop and annually maintain a prioritized list of state listed plant species and species identified by the California Native Plant Society as rare or sensitive that occur on Camp Pendleton. Ongoing.

- Develop a monitoring program for wildlife species of regional concern with a specific focus on those species likely to become proposed for listing as threatened or endangered in the near future. 2002. [Also applies to Sections 4.2.2, second objective; 4.4.2, second objective.]

- Assess the feasibility and desirability of conducting off-Base surveys of selected species and habitat types, water quality monitoring, and hydrographical surveys to contribute to the understanding of Camp Pendleton's regional contribution to species and habitat conservation and recovery. 2003. [Also applies to Sections 4.1.2, second objective; 4.2.1, first objective; 4.2.2, first and second objectives; 4.5.2, first objective.]

- Collect survey data on isolated ephemeral wetland invertebrates, including the endangered San Diego fairy shrimp and the Riverside fairy shrimp at levels and intervals to be determined in the Uplands Biological Opinion issued by the USFWS. TBD. [Also applies to Sections 4.2.2, first, second, and third objectives; 4.5.2 first objective.]

Other Planned Actions:

- Develop an inventory program for wildlife species of regional concern with a specific focus on those species on the Base likely to become proposed for federal listing as threatened or endangered in the near future. [Also applies to Section 4.2.2, second objective.] ***

- Survey for species on Base that have been proposed for ESA listing by the USFWS. [Also applies to Section 4.2.2, second objective; 4.4.2, second objective.] ***

4.5.3 Research

Essential to adaptive management, and to recovery efforts for listed species, is the knowledge gained from experimental studies and investigative research. It is the Base's intent to conduct, or allow qualified researchers/professionals to conduct, research that has the potential to provide information that supports effective avoidance, minimization, mitigation, and both regional recovery efforts. Such research is absolutely necessary if recovery efforts are to advance beyond trial and error for those species about which little is currently known. Investigative research can address specific questions about life history characteristics, habitat preferences, and response to disturbance to better facilitate avoidance and recovery efforts. All research proposals will be reviewed by appropriate Base professionals to help ensure the utility of the data collected, the study design and methodologies support the hypothesis, unintended adverse impacts are avoided, and the project supports regional natural resource management goals and objectives.

Following are examples of Base sponsored research efforts that have contributed to the understanding of the ecology of the species, potential threats, and management requirements of federally listed threatened and endangered species:

- Effects of Wildfire on Coastal California Gnatcatchers. Initiated in 1998, a multi-year study by Atwood et al. (1999, 2000) from the Antioch New England Institute (New Hampshire) has been collecting data on the ecology and behavior of the California gnatcatcher on Camp Pendleton, focusing in particular on how gnatcatcher habitat quality and distribution is influenced by fire. Funded by Camp Pendleton, this research is expected to contribute to a greater understanding of the behavior and ecology of this federally listed threatened species for natural resource managers both on Base and within the region. Final study results are for this project are still pending.

- Habitat Suitability Evaluation for Endangered Southern Steelhead Trout. A habitat suitability study (USFWS 1998f), completed in 1997 for all Base streams, evaluated the potential for the San Onofre, San Mateo, and Santa Margarita River watersheds to support runs of southern steelhead. The results of this report have provided valuable information to the Base natural resource managers and are used by other professional

biologists in the region as a means for evaluating potential steelhead recovery efforts in southern California.

- Upland Habitat Studies for Listed Species. Recently, the Base contracted the USFWS to develop methodology for identifying upland habitat areas that are important to actively manage for selected listed upland species, including the coastal California gnatcatcher, Stephens' kangaroo rat, Pacific pocket mouse, and thread-leaved brodiaea. Development of this methodology will enable the Base to better maintain habitat for listed upland species populations during project planning and will identify sites for potential future mitigation, compensation, or stewardship.

  Among other required elements, this research will involve (1) determining the utility of existing data and imagery for monitoring landscape level habitat changes; (2) mapping of selected areas and field verification of existing GIS layers; (3) locating, designating, and mapping all habitat within selected areas that has the potential to become suitable for federally listed upland species; (4) determining the general restoration approach for potential habitat areas; and (5) prioritizing the importance of selected habitat areas, including consideration of patch size and connectivity/proximity to adjacent populations and habitat (both on and off Base). This research is scheduled for completion by the end of 2001.

- California Least Tern Studies. The largest and most productive California least tern colony is found on Camp Pendleton and has been intensively studied since 1983 (see Belluomini 1993, and references therein). From 1989 to 1992, the Denver Wildlife Research Center conducted research on the interactions between terns and ravens (*Corvus corax*) at Camp Pendleton (Linz et al. 1990, 1992). The initial year's study focused on determining home ranges and habitat use patterns of territorial ravens in relation to the tern colony at White Beach (Linz et al. 1990, 1992). A 1992 study conducted by the U.S. Department of Agriculture (Avery et al. 1993), funded in part by the U.S. Navy (contract number N68711-92-LT-2006), investigated predation of California least tern eggs by common ravens, conducted experiments using nonlethal aversive techniques, and proposed management methods.

OBJECTIVE: Conduct and/or support research that has the potential to provide information that supports effective avoidance, minimization, mitigation, local and regional recovery efforts.

Priority Planned Actions:

- Establish test plots to understand best management practices for natural resource recovery after wildland fire impacts. Ongoing. [Also applies to Sections 4.6.1; 4.7.2, first objective; 4.11.3.]

- Conduct assessments of potential mitigation and management techniques for listed species. Ongoing. [Compliance requirement of Riparian BO (Reasonab & Prud, p. 32; T&C, p. 35)]

- Continue to study the effects of aircraft noise on passerines. Ongoing until 2006. [Also applies to Sections 4.4.1; 4.4.2, second objective.] [Compliance requirements of BRAC BO]

- Undertake measures to assess threats to the survival and recovery of the tidewater goby and arroyo toad on Base, including the severity of threats posed by green sunfish, bullfrog, steelhead trout and other likely predators/competitors and hydro modification. 2005. [Also applies to Sections 4.5.4; 4.6.2.] [Compliance requirement of Riparian BO (T&C, p. 35)]

- Undertake measures to assess threats to the survival and recovery of the western snowy plover and California least tern, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.4; 4.6.2.]

- Undertake measures to assess threats to the survival and recovery of the least Bell's vireo and southwestern willow flycatcher, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.4; 4.6.2.]

- Undertake measures to assess threats to the survival and recovery of the California gnatcatcher, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.4; 4.6.2.]

- Undertake measures to assess threats to the survival and recovery of the pacific pocket mouse on Base, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.4; 4.6.2.]

- Undertake measures to assess threats to the survival and recovery of the Stephens' kangaroo rat on Base, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.4; 4.6.2.]

Other Planned Action:

- Evaluate methods of species control for the Bird Aircraft Strike Hazard program (e.g., use of falconry, trained dogs, etc.). [Also applies to Section 4.4.3, second objective.] *

4.5.4 General Management (Including Compensation and Mitigation)

Management of federally listed species on Camp Pendleton includes proactive conservation initiatives, compensation for the potential temporary impacts from ongoing mission and

mission support activities (training, maintenance, recreation, etc.), programmatic instructions and a Consultation Class System to support avoidance and minimization and mitigation for permanent project impacts. General management initiatives for threatened and endangered species include predator control, habitat enhancement (e.g., exotics control), and habitat restoration. Some of these management actions also function as compensation and mitigation measures.

OBJECTIVE: Conduct management initiatives that contribute to the recovery of listed or candidate species' populations and that maintain or improve their habitats.

Priority Planned Actions:

- Where possible and reasonable, adopt the least damaging alternative of proposed activities that have potential to result in the permanent loss of listed species habitats. Use the Activity/Consultation Class System to determine the required level of consultation with the USFWS for new projects. Ongoing. [Also applies to Section 4.5.1.] [Compliance requirement of Riparian BO (Appx 5, p. 4: implem Appx 1, p. 68)]

- Enhance and manage dunes within nesting areas. Maintain and improve the endangered least tern breeding habitat and evaluate the design and feasibility of sand augmentation to the island in the Santa Margarita River. Ongoing. [Compliance requirement of Riparian BO, T&C, Appx. 1, p. 80]

- Mitigate all direct or indirect permanent impacts to federally listed species according to the measures and ratios determined in coordination with the USFWS. Ongoing.

- Where feasible and practical, use native seed stock in restoration and enhancement measures. Ongoing. [Also applies to Sections 4.6.1; 4.7.2, second objective.]

- Conduct control measures on exotic, invasive species that have a potential direct or indirect adverse impact on federally listed species or their habitat. Ongoing. [Also applies to Sections 4.6.1; 4.6.2.] [Compliance requirement of Riparian BO (Appx 1, p. 79)]

- Continue predator control measures within the vicinity of snowy plover and least tern nesting sites. Ongoing. [Compliance requirement of Riparian BO (Appx. 1, p. 80)]

- Annually maintain the endangered California least tern and threatened western snowy plover nesting areas. Ongoing. [Compliance requirement of Riparian BO (general project description)]

- Ensure that secondary roads are maintained to the extent practical in order to avoid ponding of water on the road surface in and adjacent to potential arroyo toad habitat. Ongoing. [Compliance requirement of Riparian BO (T&C, Appx. 5, p. 2)]

- Ensure that construction activities are within compliance with the terms and conditions for new construction sites in the Estuarine and Beach Ecosystem Conservation Plan, the Riparian Ecosystem Conservation Plan, the Listed Upland Species Management Program and their respective Biological Opinions, and other applicable regulations and guidelines. Ongoing.

- Publish notices and/or Base newspaper articles to Base personnel regarding sensitive species and restricted areas along the coast. Ongoing. [Compliance requirement of Riparian BO (Appx 1, p. 79)]

- Annually fence and post warning signs around the endangered least tern and snowy plover nesting areas in accordance with the Estuarine Ecosystem Conservation Plan. Ongoing. [Also applies to Section 4.5.1.]

- Explore habitat enhancement techniques for Camp Pendleton estuaries and lagoons including deepening smaller estuarine lagoons and controlling and removing exotic plants and fish. Ongoing. [Compliance requirement of Riparian BO (Appx. 1, p. 80)]

- Protect the last known nesting location of the light-footed clapper rail (Santa Margarita River). Ongoing. [Compliance requirement of Riparian BO (Appx. 1, p. 80)]

- Evaluate the feasibility of participating in cooperative watershed restoration programs, including cooperating with local governmental and nongovernmental stakeholders. Ongoing. [Also applies to Sections 4.1.2, second objective; 4.3.1, first objective; 4.7.1, first objective.]

- Undertake measures to assess threats to the survival and recovery of the tidewater goby and arroyo toad on Base, including the severity of threats posed by green sunfish, bullfrog, steelhead trout, and other likely predators/competitors and hydro modification. 2005. [Also applies to Sections 4.5.3; 4.6.2.] [Compliance requirement of Riparian BO (T&C, p. 35)]

- Complete and evaluate results of the multi-year study of effects of least tern management on western snowy plovers. Make adjustments to the Estuarine/Beach Ecosystem Conservation Plan if necessary. 2005. [Compliance requirement of Riparian BO (Appx 5, p. 6)]

- Undertake measures to assess threats to the survival and recovery of the pacific pocket mouse on Base, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.3; 4.6.2.]

- Undertake measures to assess threats to the survival and recovery of the Stephens' kangaroo rat on Base, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.3; 4.6.2.]

- Undertake measures to assess threats to the survival and recovery of the western snowy plover and California least tern, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.3; 4.6.2.]

- Undertake measures to assess threats to the survival and recovery of the least Bell's vireo and southwestern willow flycatcher, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.3; 4.6.2.]

- Undertake measures to assess threats to the survival and recovery of the California gnatcatcher on Base, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.3; 4.6.2.]

Other Planned Actions

- Undertake measures to assess threats to the survival and recovery of avian species on Base, including the severity of threats posed by likely predators/competitors. [Also applies to Section 4.4.2, first and second objectives.] *

4.6 EXOTIC INVASIVE SPECIES CONTROL

One of the most severe environmental problems facing the Base's natural areas is the explosive spread of exotic invasive species. The term invasive species is defined by the Presidential Executive Order 13112 to mean "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." The Executive Order goes on to define an alien species as any species not native to a particular ecosystem, including the seeds, eggs, spores, or other biological material capable of propagating that species.

Exotic invasive plants and animals have the potential to cause vast ecological and economic damage, and sometimes pose human health impacts in areas they infest. Among the potential adverse impacts caused by exotic invasive species are:

- A decrease in biodiversity of native communities as a result of competitive exclusion, predation, parasitism, disease, etc.;

- A reduction in habitat quantity and quality for native species (including threatened, endangered, and sensitive species) through the alteration of forage, shelter requirements, water availability/quality, etc.;

- Impairing ecosystem functioning capabilities in general as a result of increased soil erosion, stream sedimentation, clogged waterways, altered nutrient cycling, increased flooding, etc.;

- An increase in susceptibility to wildfires;

- A decrease in the quality or availability of training lands in areas of heavy infestation; and

- Human health risks.

The purpose of the exotic invasive species control program is to develop and implement a strategy for the control of such plants and animals on Base. "Control" means, as appropriate, the eradication, suppression, reduction, or management of invasive species populations; the prevention of invasive species introductions and their spread from already infested areas; and the reduction of potential adverse effects of invasive species through, for example, the restoration of native species (EO 13112).

Subject to the availability of funds this program will endeavor to: (1) prevent the introduction of invasive species; (2) detect and respond rapidly to and control populations of invasive species in a cost effective and environmentally sound manner; (3) monitor invasive species populations accurately and reliably; (4) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (5) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (6) promote education on and awareness of invasive species.

All field efforts to conduct exotic species control are performed in an experimental fashion prior to basewide/broadcast treatment to ensure efficacy of techniques under local conditions and avoidance of unintended adverse impacts to native species.

GOAL: Seek to eliminate invasive exotic species from Camp Pendleton to conserve and enhance native flora and fauna and the functional value of natural systems.

GOAL: Seek to understand natural processes and impacts of invasive exotic species through monitoring, investigative research, and data analysis in order to make informed decisions necessary for exotic species management.

4.6.1 Exotic Invasive Plants

Of the more than eight hundred plant species on Base, nearly 20% are considered exotic (i.e., nonnative to California). The abundance of exotic, weedy plant species poses a special problem for natural resource management at Camp Pendleton. Invasive, exotic plants are often detrimental to native communities in that they may compete with native plant species, reduce the diversity and quantity of native species; render habitat unsuitable for native animals by altering forage and shelter requirements; cause increased rates of erosion and

stream sedimentation; create a system that is more susceptible to wildfires; and impair general ecosystem functioning.

To help reduce exotic plant species on Base and to compensate for temporary and permanent impacts from ongoing training activities, Camp Pendleton has conducted removal efforts for several targeted species. These include the giant reed grass (*Arundo donax*), artichoke thistle (*Cynara cardunculus*), and perennial pepperweed (*Lepidium latifolium*). The Base has not formally approved a basewide exotic plant control program, but a conceptual plan has been developed. The riparian portion of this program has been completed and implementation has begun in selected riparian areas of the Base. This exotic plant control plan focuses on high priority sites, targeting weedy, invasive upland species, including artichoke thistle, mustard (*Brassica* spp.) fennel (*Foeniculum vulgare*), iceplant (*Mesembryanthemum crystallinum)*, tamarisk (*Tamarix parviflora*), and tree tobacco (*Nicotiana glauca*). Artichoke thistle was nearly eradicated from the Base during previous exotics control efforts. However, new infestations have recently been identified in several locations within the State Parks lease area. Plans are currently underway to identify, map, and eradicate these new infestations and prevent reinfestation of the Base.

As part of the exotic plant removal program, Camp Pendleton has been involved in partnering efforts to help ensure that exotics removal on Base is consistent with, and contributes to, regional efforts. Since 1995, the Marine Corps has been partnering with federal regulators, The Nature Conservancy, and private land owners and participating in "Team *Arundo*" workshops to implement a systematic multi-year *Arundo donax* (giant reed) control program on the Santa Margarita River. *Arundo* is an invasive, non-native plant that has infested and adversely affected much of the riparian habitat within southern California watersheds in general and the Santa Margarita River watershed in particular. Approaching the control of *Arundo* from a regional perspective has enabled removal efforts to begin as far up stream as possible to preclude downstream spread or re-infestation from upstream sources. Since 1995, *Arundo* treatments have been initiated at site specific locations along a 17-mile section of the watershed and are in various stages of completion. All control projects were initially funded for 5-year treatment periods through the Endangered Species Act and Clean Water Act mitigation requirements and/or as part of Camp Pendleton's environmental stewardship program. Lessons learned for these control efforts are being translated into greater understanding of cost reductions, control efficiencies, treatment effectiveness, and plant community responses in the San Luis Rey River exotics control programs, as well as other watershed management efforts within the southern California ecoregion. The Santa Margarita and San Luis Rey Weed Management Area (SMSLR/WMA) program, sponsored and coordinated by the Mission Resource Conservation District (Mission RCD), is a follow-on program for weed management at the watershed scale. The Mission RCD has initiated planning efforts for the continued development and implementation of regional *Arundo* control.

Camp Pendleton plays an active role in the organization, with staff having assisted in writing several grant proposal letters for the SMSLR/WMA program. In addition, Base staffs from Office of Water Resources, Land Management Branch, and Wildlife Management Branch attend periodic SMSLR/WMA meetings.

The Base and the SMSLR/WMA coordinate exotics control project activities to ensure no "gaps" exist on the Santa Margarita River. In this way, Camp Pendleton ensures that upstream sources of *Arundo* are being reduced, thereby preventing re-infestation of *Arundo* on Base lands. Camp Pendleton has further contributed to the watershed based *Arundo* control efforts along the Santa Margarita River by carrying out *Arundo* removal on Fallbrook Public Utilities District lands situated upstream from the Base. This has greatly contributed to the watershed based *Arundo* control effort. This effort counts for mitigation for the Base, while contributing to improved sensitive species habitat, recreation, flood control, and long-term fire risk reduction for public land used by many Fallbrook residents.

OBJECTIVE: Endeavor to control the spread, and prevent the introduction of, exotic invasive plant species on Base in order to minimize adverse economic, ecological, and human health impacts.

Priority Planned Actions:

- Provide focused training for the natural resources staff member(s) responsible for exotic plant species control. Ongoing.

- Reduce or eradicate exotic vegetation from riparian areas and temporarily disturbed sites on Camp Pendleton in accordance with the Riparian Ecosystem Conservation Plan and the Riparian BO. Ongoing. [Also applies to Section 4.3.4.] [Compliance requirement of Riparian BO (T&C, p. 33; Appx 5, p. 3)]

- Continue exotic plant site identification, monitoring, and control efforts in upland habitats to ensure a low reintroduction rate. Ongoing. [Also applies to Section 4.2.2, third objective.]

- Map the spread of exotic plants and successful removal by control programs, including regional data when possible. Ongoing. [Also applies to Sections 4.2.2, third objective; 4.2.3; 4.8.] [Compliance requirement of Riparian BO (T&C, p. 35; Appx 4-tracking community distribution/value, habitat status)]

- Conduct control measures on exotic, invasive species that have a potential direct or indirect adverse impact on federally listed species or their habitat. Ongoing. [Also applies to Sections 4.5.4; 4.6.2.] [Compliance requirement of Riparian BO (Appx 1, p. 79)]

- Aggressively control artichoke thistle in all known locations of reinfestation on Base. Ongoing.

- Where feasible and practical, use native seed stock in restoration and enhancement measures. Ongoing. [Also applies to Sections 4.5.4; 4.7.2, second objective.]

- Where possible use native seed stock if conducting post-fire reseeding. Ongoing. [Also applies to Sections 4.7.2, second objective; 4.11.3.]

- Discourage the use of invasive exotic plants for landscaping, such as those listed by the Exotic Pest Plant Council and the California Native Plant Society. Ongoing. [Also applies to Section 4.8.]

- Annually, review the Base's Exterior Architecture Plan to help ensure that the use of native plant species is maximized in landscaping practices. Ongoing.

- Participate in regional forums and planning initiatives for the removal of invasive, exotic species. Ongoing. [Also applies to Sections 4.1.2, second objective; 4.6.2.]

- Educate Base community members and visitors concerning the potential adverse impacts of exotic invasive species, especially where such promotion may help prevent the introduction and spread of these species. Ongoing. [Also applies to Section 4.6.2.]

- Exercise vigilance for the potential introduction of a new invasive, exotic species and, should such an introduction occur, pursue timely and aggressive control measures to prevent establishment on Base. Ongoing. [Also applies to Section 4.6.2.]

- Establish test plots to understand best management practices for natural resource recovery after wildland fire impacts. Ongoing. [Also applies to Sections 4.5.3; 4.7.2, first objective; 4.11.3.]

- Develop an Exotic/Invasive Species Management Plan for MCAS. 2002. [Also applies to Section 4.6.2.]

- Beginning in 2003, initiate control efforts for fennel per the Listed Upland Species Management Program and its BO. 2003.

- Develop a research plan for the management and monitoring of exotic plant species. 2003.

- Develop a Base Exotic/Invasive Species Management Plan for the Base that is consistent with the National Invasive Species Management Plan (Executive Order 13112). 2003. [Also applies to Section 4.6.2.]

Other Planned Action:

- Evaluate alternative tamarisk control methods than those described in the Riparian Ecosystem Conservation Plan and the Riparian and Estuarine/Beach Biological Assessment. *

4.6.2 Exotic Animals

As with exotic plants, exotic animals may also pose a threat to native species and communities on Base for similar reasons (e.g., competitively excluding native species, altering the habitat in a manner which favors other exotics, predation, nest parasitism, etc.). Currently, the Base is conducting control efforts on several nonnative invasive animals, including the beaver (*Castor canadensis*), brown-headed cowbird (*Molothrus ater*), bullfrog (*Rana catesbiana*), red swamp crayfish (*Procambarus clarkii*), and several exotic fish species (e.g., mosquitofish [*Gambusia affinis*], carp [*Cyprinus carpio*], black bullhead [*Ameiurus melas*], and green sunfish [*Lepomis cyanellus*]). Several potential exotic wildlife species may be candidates for control efforts in the future, including: feral pigs, fire ants, Argentine ants, Africanized honeybees, and feral dogs and cats.

OBJECTIVE: Endeavor to control the spread, and prevent the introduction of, exotic invasive animal species on Base in order to minimize adverse economic, ecological, and human health impacts.

Priority Planned Actions:

- Annually conduct and track (inventory) animal damage control, predator management, and cowbird control activities on Base. Ongoing. [Also applies to Sections 4.2.2, third objective; 4.4.2, first objective; 4.4.3, first objective.] [Compliance requirement of Riparian BO (Appx 4, p. 2)]

- Provide focused training for the natural resources staff member(s) responsible for exotic animal species control. Ongoing.

- Conduct control measures on exotic, invasive species that have a potential direct or indirect adverse impact on federally listed species or their habitat. Ongoing. [Also applies to Sections 4.5.4; 4.6.1.] [Compliance requirement of Riparian BO (Appx 1, p. 79)]

- Continue to implement the plan for the control of exotic fish populations in selected areas of the Base to enhance populations of endangered fish and amphibian species. Ongoing.

- Per the Riparian Ecosystem Conservation Plan and its Biological Opinion, conduct brown-headed cowbird trapping to reduce nest parasitism from this exotic species and to help increase the reproductive success of native bird species. Ongoing. [Also applies to Section 4.4.2, second objective.]

- Educate Base community members and visitors concerning the potential adverse impacts of exotic invasive species, to help prevent the introduction and spread of these species. Ongoing. [Also applies to Section 4.6.1.]

- Exercise vigilance for the potential introduction of a new invasive, exotic species and, should such an introduction occur, pursue timely and aggressive control measures to prevent establishment on Base. Ongoing. [Also applies to Section 4.6.1.]

- Participate in regional forums and planning initiatives for the removal of invasive, exotic species. Ongoing. [Also applies to Sections 4.1.2, second objective; 4.6.1.]

- Develop an Exotic/Invasive Species Management Plan for MCAS. 2002. [Also applies to Section 4.6.1.]

- Develop a Base Exotic/Invasive Species Management Plan for the Base that is consistent with the National Invasive Species Management Plan (Executive Order 13112). 2003. [Also applies to Section 4.6.1.]

- Undertake measures to assess threats to the survival and recovery of the tidewater goby and arroyo toad on Base, including the severity of threats posed by green sunfish, bullfrog, steelhead trout and other likely predators/competitors and hydro modification. 2005. [Also applies to Sections 4.5.3; 4.5.4.] [Compliance requirement of Riparian BO (T&C, p. 35)]

- Undertake measures to assess threats to the survival and recovery of the pacific pocket mouse on Base, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.3; 4.5.4.]

- Undertake measures to assess threats to the survival and recovery of the Stephens' kangaroo rat on Base, including the severity of threats posed by likely predators/competitors. 2006. [Also applies to Sections 4.5.3; 4.5.4.]

Other Planned Actions:

- Establish Camp Pendleton's carrying capacity for bison and develop a bison management plan. ***

- Assess the feasibility of halting the introduction of mosquito fish into waters on Base for the control of mosquitoes. **

4.7 WATERSHED MANAGEMENT

The natural pattern of water flow has been significantly altered on Camp Pendleton over the last century. In some cases, altered flows have led to increased soil erosion. The impacts that this alteration may have on riparian cover and diversity, nonpoint source pollution, and water supply have yet to be described. Additionally, the flows entering the Base have been altered significantly by human development in the Santa Margarita and San Mateo watersheds. Since

the Base sits at the bottom of several watersheds, it has an interest in every activity upstream that affects flow and water quality.

Watershed protection activities on Camp Pendleton primarily involve water quality protection and erosion control. These are achieved through nonpoint source pollution control (including storm water, wastewater, nonpoint source pollution, etc.), fire management, vegetation management, and land use management. Erosion and water quality management on Camp Pendleton is in accordance with the best management practices (BMPs) approved by the State of California under the Nonpoint Source Pollution Control Plan and the Phase II Municipal Storm Water Permit.

Camp Pendleton seeks to implement the "Clean Water Action Plan: Restoring and Protecting America's Waters" and the Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management (65 Federal Register 62565-62572, October 18, 2000). Furthermore, as required by Executive Order 11988, May 24, 1977 and 2000 (Unified Policy on Watershed Management Initiatives) the Marine Corps, when feasible, avoids direct or indirect development of floodplains and restores and preserves the natural and beneficial values served by floodplains. Marine Corps installations are required to evaluate the potential effects of actions in floodplains in order to provide an early opportunity for public review of proposals in floodplains according to NEPA procedures. Camp Pendleton also complies with the Watershed Management Approach chapter of the San Diego Regional Water Quality Control Board's Basin Plan.

Many watershed issues cannot be addressed by the Base alone, but require Camp Pendleton to participate in cooperative planning and management efforts. These issues include water supply, water quality, wastewater management, aquatic habitat protection, flood protection, and floodplain management. To address these issues effectively requires the Base to coordinate with surrounding jurisdictions during infrastructure and land use development planning and approval processes. Camp Pendleton takes a leadership role within the Santa Margarita River watershed in promoting the watershed approach, and intends to take a similar approach in the San Mateo Creek watershed as urbanization increases.

In 1992-94, Camp Pendleton and Riverside County participated in an effort to improve cooperative land use and water resources planning within the Santa Margarita River watershed. The two Riverside County supervisors whose districts are in the watershed formed a committee with one San Diego County supervisor and representatives of the Cities of Murrieta and Temecula and Camp Pendleton. Technical sub-committees, addressing water supply, water quality, habitat, recreation, flood protection, and land use were formed to advise the committee. The initiative was supported by grants from U.S. Environmental Protection Agency and the California Coastal Conservancy. Its intent was to improve the quality of information provided to land use decision makers about the effects of their decisions at the watershed scale. In the aftermath of devastating flooding in the Santa Margarita River watershed in 1993, the initiative became highly politicized and ultimately bogged down and the group stopped meeting.

Camp Pendleton is currently seeking to establish an alternative forum or mechanism to accomplish the original goals of this initiative, and has facilitated regional discussion groups

on water supply and water quality. Camp Pendleton is participating as a member of the Murrieta Creek Advisory Committee with regard to a major flood control and environmental restoration project being developed by the Army Corps of Engineers in the upper watershed. Most recently, Camp Pendleton became a partner with San Diego County, the U.S. Bureau of Reclamation, San Diego State University, and other stakeholders in a proposal seeking a state grant for watershed plan development, which the Base hopes to integrate with Riverside County's other comprehensive planning efforts.

GOAL: Incorporate best management practices into watershed and habitat protection programs to conserve and enhance native fauna and flora and the functional value of natural systems.

GOAL: Conserve and manage natural resources in accordance with environmental laws and their implementing regulations.

GOAL: Manage vegetative cover, erosion, and fire so areas remain usable and available for amphibious, land, and air based training.

GOAL: Provide fully compliant and reliable water supply and wastewater treatment, good stewardship of all water resources, and leadership in watershed management.

4.7.1 Water Resources Management

Water is a scarce and limiting resource in southern California. While the majority of water districts in southern California are forced to import water from hundreds of miles away from the Sacramento Delta and the Colorado River, Camp Pendleton has managed its water supply to provide for all of its water demands through local groundwater sources within four main basins on Base. Protection of this critical resource is essential to the continued ability of the Base to accomplish its mission.

Water resources issues include water rights, water supply, water quality, wastewater, stormwater, flood prevention, and watershed management. The Base works actively to protect its water resources from quality, quantity, and legal threats. Camp Pendleton protects the adequacy of its water supply by implementing conservation programs and by defending its adjudicated water rights through technical, administrative, and legal mechanisms. The Base protects the quality of the water through pollution prevention programs, wellhead protection and treatment, and active involvement in watershed based pollution control programs. Marine Corps Base, Camp Pendleton is committed to providing high quality water to Base consumers. The facilities, environmental, and legal staffs on Base, share Camp Pendleton responsibilities for water quality management with the goal to ensure that current and future demands are met in accordance with mission and quality of life requirements.

The Base Water Steering Committee (BWSC), which is composed of designated staff from the AC/S Facilities, AC/S Environmental Security, AC/S MCCS, MCAS, and Western Area Counsel Office, meets regularly to effect coordination and strategic planning of Base water

resources. Water related issues this group meets to discuss range from flood protection requirements and upgrades/repairs to existing water and wastewater facilities. This group also has been instrumental in the development of future infrastructure upgrades and broad scope objectives to ensure competency and compliant program management.

The Base Water Steering Committee is responsible for the implementation of the Strategic Water Plan (SWP). This Plan states the Base's strategic vision for water resources and identifies and proposes strategies to achieve that vision (a majority of the objectives and planned actions within this section were derived from the SWP). The committee members are responsible to the BWSC for adherence to, and implementation of, the SWP by the organizations that they represent on the committee. The BWSC does not have direct authority over the staff sections, offices and departments represented on the BWSC, but the BWSC tracks implementation of the SWP at regular quarterly meetings.

OBJECTIVE: Maintain water supply independence by (1) maximizing development of local water sources, (2) preserving/developing alternative water sources, (3) optimizing wastewater recycling, and (4) meeting all mandated water conservation goals.

Priority Planned Actions:

- Evaluate the feasibility of participating in cooperative watershed restoration programs, including cooperating with local governmental and nongovernmental stakeholders. Ongoing. [Also applies to Sections 4.1.2, second objective; 4.3.1, first objective; 4.5.4.]

- Settle litigation with Rancho California Water District to guarantee adequate quantity, quality, and variability of stream flow in Santa Margarita River. 2002.

- Settle litigation with Fallbrook Public Utility District to optimize development of the Base's groundwater basins and supersede 1968 Memorandum of Agreement. 2002.

- Develop an agreement within the Santa Margarita Watershed to account for water conservation regionally. 2002.

- Develop plans to optimize development of the San Mateo Basin. Submit specific projects through normal Base staffing procedures and the Base NEPA process for decision and approval. 2003.

- Develop Permit 15000 and seek license. 2007.

- Develop plans to establish operational link between North and South water systems. Submit specific projects through normal Base staffing procedures and the Base NEPA process for decision and approval. 2008.

Other Planned Actions:

- Develop plans to establish operational connections of the North and South water systems to off-Base water with capacity to meet 100% of emergency requirements. Submit specific projects through normal Base staffing procedures and the Base NEPA process for decision and approval. ***

- Execute renegotiated Four Party Agreement to maximize the benefits of live stream discharge of treated sewage effluent. ***

- Beneficially reuse 70% of dry weather treated sewage effluent in the South water system. Submit specific projects through normal Base staffing procedures and the Base NEPA process for decision and approval. **

- Beneficially reuse 70% of dry weather treated sewage effluent in the North water system. Submit specific projects through normal Base staffing procedures and the Base NEPA process for decision and approval. *

OBJECTIVE: Provide leadership in watershed management.

Priority Planned Actions:

- Lead the Santa Margarita River Watershed Water Quality Monitoring Group to develop and propose a coordinated watershed-wide water quality monitoring plan. 2002.

- In partnership with The Nature Conservancy and San Diego State University, develop and implement a long-term monitoring program to measure and correlate flow, sediment transport, water chemistry, and habitat in the lower Santa Margarita River watershed. 2002.

OBJECTIVE: Manage stormwater to optimize resources and comply fully with laws and regulations.

Priority Planned Actions:

- Prepare draft Phase II Municipal Stormwater Permit Application and compliance plan. 2003.

Other Planned Action:

- Participate in the Santa Margarita River watershed stormwater permit-holder committee. ***

OBJECTIVE: Ensure protection of Base assets.

Priority Planned Actions:

- Develop plans to ensure 100-year flood protection of all new facilities. Submit specific projects through normal Base staffing procedures and the Base NEPA process for decision and approval. Ongoing.

- Complete Phase III Early Warning System improvements. 2003.

- Execute agreements to use cooperative management of upstream hydrology to ensure 200-year flood protection of MCAS Camp Pendleton, and the Ranch House. 2004.

OBJECTIVE: Ensure that all Base planning programs consider effects on, and limitations of, water resources and infrastructure.

Priority Planned Actions:

- Make water resources and water infrastructure decisions based on planning that considers all aspects of water resources issues, including current and projected operational and regulatory requirements. Ongoing.

- Improve the data collected, used for, and provided by water resources planning. Ongoing.

OBJECTIVE: Ensure the adequate supply and reliable delivery of safe water to support consumptive and environmental requirements of the Base. Use best management practices to minimize nonpoint sources of water pollution. (U.S. DoD 1996)

Priority Planned Actions:

- Continue to monitor tide levels and water quality in the Santa Margarita River; evaluate potential changes to the estuarine ecosystem as a result of ongoing actions and projects and document the periods when the other coastal lagoons are subject to tidal influence. Ongoing. [Also applies to Sections 4.2.3; 4.3.3.] [Compliance requirement of Riparian BO (T&C, Appx 4, p. 2)]

- Continue groundwater monitoring in all drainages where groundwater is extracted to determine and manage the potential effect on listed species habitat. Ongoing. [Also applies to Section 4.2.3.] [Compliance requirement of Riparian BO (T&C, Appx 4, p.1)]

- Monitor stream water quality, flood regimes, and storm event frequency. Ongoing. [Also applies to Section 4.2.3.] [Compliance requirement of Riparian BO (T&C, Appx 4, p.1)]

- Monitor the effects of sedimentation in Santa Margarita River Estuary and coastal lagoons that are subject to upstream disturbance from programmatic, construction activities, and off Base activities. Ongoing. [Also applies to Sections 4.3.3; 4.7.2, first objective.] [Compliance requirement of Riparian BO (Appx 4, p.2)]

4.7.2 General Vegetation Management and Soil Conservation

Watershed, floodplain, fuel break/fire management, prescribed burning, grounds maintenance, landscaping, and erosion control can all be viewed as components of vegetation management and soil conservation. Meeting the objectives of each of these components requires an integrated approach to vegetation management as well as the other natural resources components identified in this chapter. Legislation and regulations relevant to vegetation management and soil conservation are summarized in Appendix B.

In 1990, in response to anecdotal reports of erosion problems (provided by Marines, Fire Department personnel, FMD, AC/S ES staff, contractors, researchers, etc.), Camp Pendleton began a systematic review of training lands to identify locations on Base experiencing erosion. Since then, the Base has expended substantial time, effort, and funds in an attempt to adequately identify, monitor, and address erosion problems basewide. As part of its commitment to managing natural resources and as partial compensation for temporary impacts incurred from training and other activities across the Base, Camp Pendleton plans to implement a formal erosion control program.

Erosion of the sea cliffs, bluffs, and canyon heads along Camp Pendleton's shoreline is catastrophic, episodic, site specific, and directly related to prevailing meteorological conditions and, in recent years, to anthropogenic alterations of natural drainage patterns (Khun 1999). To address the problem of erosion on Camp Pendleton along the San Onofre State Beach, Kuhn (1999) documented the landslide movement between old Highway 101 and the shoreline since 1980 and the storm water runoff effects as a result of natural and anthropogenic diversions such as roads; railroad installations; agricultural, military, and camping operations; fires; seismic activity; and high rainfall. This study provided valuable insight into the history of the erosion problem, the cumulative effects, and the severity of the problem on a site specific basis within the study area. Recommendations for future management actions were also provided.

An erosion site database was developed in 1997 to prioritize limited resources and focus on areas where erosion repair was feasible. This field inventory identified approximately 130 locations where potential erosion problems exist. Several of the projects have already been started (Table 4-3). At present, erosion control activities are focused on specific sites. An Erosion Management Plan is being developed as the first phase of programmatic erosion control measures.

TABLE 4-3. Recent (since 1997) erosion control projects conducted or proposed on Base.

Date	Project	Location	Contractor	Status
1999	Training lands reclamation	To be determined	Claude Boehm	Ongoing
1999	DZ tank park	DZ tank park	Resource Conserv-ation District (RCD)	Completed 1999
1998	Erosion control plan	Basewide	Tierra Data	Draft submitted 11/1999
1998	Coastal canyons	Coastal canyons	RCD	Ongoing
1998	DZ tank park	DZ tank park	RCD	Ongoing
1998	Bluff erosion study	North of White Beach	Gerry Kuhn	Completed 1999
1997	DZ tank park	DZ tank park	RCD	Ongoing

Implementation of the Erosion Management Plan is expected to directly benefit natural resources through: (1) the reduction of soil erosion and subsequent sedimentation at adjacent habitats, streams, and drainages; (2) enhanced vegetative recovery on site; (3) potential expansion of habitats for natives species; and (4) exotic pest plant reduction and control.

OBJECTIVE: Protect and restore soil productivity, watershed functioning, water quality, and wildlife habitat through effective implementation of best management practices to prevent and/or control soil erosion.

Priority Planned Actions:

- Provide focused training for the natural resources staff member(s) responsible for soil conservation and erosion control. Ongoing.

- Establish test plots to understand best management practices for natural resource recovery after wildland fire impacts. Ongoing. [Also applies to Sections 4.5.3; 4.6.1; 4.11.3.]

- In the preliminary engineering design and construction of facilities involving ground disturbance, incorporate soil and water conservation and native vegetation landscaping, as appropriate, per the White House Memorandum for the Heads of Executive Departments and Agencies (26 April 1994) and Executive Order 13112 (3 February 1999). Ongoing. [Also applies to Section 4.8.] [Compliance requirement of Riparian BO (Appx 1, pp. 70, 87; Appx 5, p. 3)]

- Monitor the effects of sedimentation in Santa Margarita River Estuary and coastal lagoons that are subject to upstream disturbance from programmatic, construction activities, and off Base activities. Ongoing. [Also applies to Sections 4.3.3; 4.7.1, sixth objective.] [Compliance requirement of Riparian BO (Appx 4, p.2)]

- When row crop outgrants come up for renewal, review Soil and Water Conservation plans for compliance with all applicable natural resource requirements. Ongoing. [Also applies to Section 4.10.2.]

- Review damage caused by unauthorized off road travel and incorporate into planned restoration efforts and routine maintenance. Ongoing. [Also applies to Section 5.4.]

- Establish a Natural Resource Damage Repair program by 2003. Implement repair actions as needed in a timely manner. 2003.

- Complete development of research based specifications and standards for reseeding/revegetation of disturbed sites. 2002.

- In collaboration with Camp Pendleton land users, federal, state, tribal, local governments, nongovernmental organizations, private organizations, and the public develop a shared vision of what constitutes desirable future watershed conditions for the Santa Margarita River and the San Mateo Creek. 2003. [Also applies to Section 4.1.1, first objective; 4.1.2, first objective.]

Other Planned Actions:

- Restore and enhance coastal dunes. [Also applies to Sections 4.3.3; 4.7.2, second objective.] ***

- Reduce encroaching bluff erosion. Submit specific projects through normal Base staffing procedures and the Base NEPA process for decision and approval. [Also applies to Sections 4.3.3; 4.7.2, second objective.] **

- Monitor the effects of off road vehicle use and provide for the rehabilitation of training lands that have excessive degradation. [Also applies to Section 4.2.3.] **

OBJECTIVE: Implement an Erosion Control Management Plan.

Priority Planned Actions:

- Annually evaluate the prioritization of erosion control sites and apply best management practices to control measures for areas of severe gullying to decrease hazardous training conditions. Ongoing.

- Apply best management practices to erosion control measures for firebreaks and roads basewide. Ongoing.

- Where feasible and practical, use native seed stock in restoration and enhancement measures. Ongoing. [Also applies to Sections 4.5.4; 4.6.1.]

- Where possible use native seed stock if conducting post-fire reseeding. Ongoing. [Also applies to Sections 4.6.1; 4.11.3.]

- Complete the Erosion Control Management Plan. 2003.

Other Planned Actions:

- Restore and enhance coastal dunes. [Also applies to Sections 4.3.3; 4.7.2, first objective.] ***

- Reduce encroaching bluff erosion. Submit specific projects through normal Base staffing procedures and the Base NEPA process for decision and approval. [Also applies to Sections 4.3.3; 4.7.2, first objective.] **

4.8 GROUNDS MAINTENANCE AND LANDSCAPING

Grounds maintenance and landscaping includes considerations for weed control and urban forestry. It is Marine Corps policy that environmentally and economically beneficial landscaping practices be used. These practices are outlined in a Memorandum for Heads of Executive Departments and Agencies issued by the President (Presidential Memorandum) dated 26 April 1994. The Presidential Memorandum directs federal agencies to use landscaping techniques that enhance the local environment and minimize the adverse effects that landscaping can have on the environment. The Presidential Memorandum stresses use of regionally native plants and practices that conserve water and prevent pollution. Integrated measures include reducing use of fertilizers, pesticides, and water use for both economic and

environmental benefits. With regard to the control of noxious weeds, Marine Corps installations will cooperate with state programs for controlling noxious plants. Camp Pendleton allows access for that control, consistent with installation safety and security considerations and when similar control measures have been followed on privately owned lands. Grounds maintenance activities are integrated with fire management with respect to clearing around buildings.

Many locations at Camp Pendleton have species protected by the Endangered Species Act, including areas in the immediate vicinity of developed and landscaped areas. To help ensure compatibility with federally listed species and natural resource management in general, the Base Exterior and Architecture Plan contains a list of approved plants that may be used for landscaping on Base. Changes to this list are reviewed by the Resource Management Division to ensure consistency with the Base's exotic species control program.

Prior to clearing natural vegetation, AC/S ES (Environmental Officer for the Air Station) is consulted with for natural resources impacts. During the breeding season site surveys are required to locate active bird nests that are removed only after obtaining required permits and/or "take" authorization from the USFWS. Pesticide application must be coordinated with the Base pesticide coordinator and should be part of an integrated pest management approach. Mowing around runways and parking aprons is done with consideration that federally listed and sensitive species are in the immediate vicinity of the runways.

GOAL: Develop and implement a Native Landscaping Plan

GOAL: Ensure that grounds maintenance and landscaping operations are integrated and consistent with natural resource goals and objectives.

OBJECTIVE: Provide a plan for management and expansion of community landscapes on Base. Conserve water, protect water quality, reduce runoff and erosion, and decrease plant nutrient loss by reducing the demand for water in landscaping. Promote use of native species in landscaping practices.

Priority Planned Actions:

- Map the spread of exotic plants and successful removal by control programs, including regional data when possible. Ongoing. [Also applies to Sections 4.2.2, third objective; 4.2.3; 4.6.1.] [Compliance requirement of Riparian BO (T&C, p. 35; Appx 4- tracking community distribution/value, habitat status)]

- Discourage the use of invasive exotic plants for landscaping, such as those listed by the Exotic Pest Plant Council and the California Native Plant Society. Ongoing. [Also applies to Section 4.6.1.]

- Review annually and recommend changes to the Base landscaping plans for compliance with the White House Memorandum for the Heads of Executive Departments and Agencies (26 April 1994) and Executive Order 13112 (3 February 1999). Ongoing.

- In the preliminary engineering design and construction of facilities involving ground disturbance, incorporate soil and water conservation and native vegetation landscaping, as appropriate, per the White House Memorandum for the Heads of Executive Departments and Agencies (26 April 1994) and Executive Order 13112 (3 February 1999). Ongoing. [Also applies to Section 4.7.2, first objective.] [Compliance requirement of Riparian BO (Appx 1, pp. 70, 87; Appx 5, p. 3)]

- Use the exotic plant control program to control spread of exotic landscaping plants into natural areas. Ongoing.

- Review and revise the flightline mowing program Standard Operating Procedures to maintain consistency with BASH program. 2003.

4.9 COMMERCIAL FORESTRY – N/A at Camp Pendleton

4.10 GRAZING AND AGRICULTURAL OUTLEASES

AC/S Environmental Security is responsible for overseeing agricultural, grazing, and seed collecting outleases. These programs are consistent with the multiple use concept adopted by the Marine Corps for its lands. The leases benefit the Marine Corps by providing sound and appropriate land uses, along with income to the Base. The agricultural outlease program has operated successfully for many years. The success is due partly to deep soils, the mild coastal climate, and access to water. Proximity to urban markets also provides for the economic success of these enterprises.

Each agricultural outlease contains a Soil and Water Conservation Plan specifying practices and projects to be performed by the lessee as part of the contract. It includes specific soil and water conservation practices required to protect and improve the productivity and fertility of the land, a schedule for application of the required practices, and provisions for restoration of the land upon termination of the lease. In addition, each plan includes agricultural and pest management practices that are consistent with state and federal regulatory requirements and the overall goal of the installation. Conservation measures currently include various erosion control projects, irrigation system upgrades, pest management requirements, fire prevention, debris removal, road damage prevention and access policies. Leased parcels are routinely monitored for compliance with the lease documents and erosion specifications.

GOAL: Evaluate the compatibility and fair-market value of the agricultural and grazing leases, in conjunction with the military mission and natural resource management.

4.10.1 Livestock Grazing

The Base leases out approximately 24,000 acres for sheep grazing. The acreage available for grazing is located in active training areas and is used only when grazing will not interfere with military training. The established animal carrying capacity is set at approximately 44,000 sheep-unit months (a sheep-unit month is the amount of forage a single ewe-lamb pair will consume in a month). Grazing is permitted mainly on annual grasslands south of the Santa Margarita River and on perennial grasslands north of the river (Figure 2-9). Grazing is also used for vegetation control within the fenced compound at the Las Pulgas Ammunition Supply Point to maintain vegetation within height limits specified in fire hazard regulations. Sheep have also been used to abate fire hazards on specific ranges).

Associated with the equestrian program on Base are two pastures for horse grazing. The larger pasture is approximately 1,309 acres and covers much of the Lima training area. The small pasture, 123 acres, is adjacent to the stables. These pastures are available for leased grazing. The number of horses and frequency of usage varies from year to year. As the horse grazing is associated with recreational activities, MCCS provides the lead for the management and use of these areas.

OBJECTIVE: Ensure the long term viability, compatibility, and fair-market value of the grazing leases, consistent with the needs of the military mission and natural resource protection.

Priority Planned Actions:

- Evaluate grazing levels (from both sheep grazing leases and horse pasture usage) to ensure resource sustainability and minimal adverse impacts to training, Base operations, and federally listed threatened and endangered species. Ongoing.

- Monitor the number and class of animal permitted to graze under lease agreements on Base. Ongoing.

- Ensure all present and future Base Orders address the activities of outgrantees, including row crop and grazing leases, as appropriate. Ongoing. [Also applies to Section 4.10.2.]

- Evaluate horse grazing and prepare a plan to ensure the sustainability of the resources and the avoidance and minimization of adverse impacts to federally listed species. 2003. [Also applies to Section 5.3.3.]

- Develop a Grazing Management Plan. 2003.

- Develop a Standard Operating Procedure addressing specific environmental compliance actions required by all outgrantees, including row crops, issued aboard Camp Pendleton. 2005. [Also applies to Sections 4.10.2; 4.10.3.]

4.10.2 Row Crop Production

Approximately 1,400 acres of land on Base are leased out for farming. Agricultural leases are typically for 5 year. In accordance with the Soil and Water Resources Conservation Act of 1977, each agricultural outlease must have a Soil and Water Conservation Plan specifying practices and projects to be performed by the lessee as part of the contract. Conservation measures currently include erosion control projects, irrigation system upgrades, pest management requirements, fire prevention, debris removal, road damage prevention, and access policies. Each lease also specifies soil and water conservation practices required to protect and improve land productivity and fertility, a schedule for application of the required practices, and provisions for restoration of the land upon termination of the lease. Additionally, each plan includes agricultural and pest management practices that are consistent with state and federal regulatory requirements and the overall goals of the Base.

Funds from agricultural leases can only be used for administrative support of agricultural leases and financing multiple land use management programs. These funds are specifically restricted from being utilized for mitigation funding and funding of non-land management staff at Camp Pendleton. These funds are traditionally used for erosion control efforts, the long term trend monitoring program, rare plant surveys, natural resource staff positions, etc.

OBJECTIVE: Ensure the long term viability, compatibility, and fair-market value of the row crop leases, consistent with needs of the military mission and natural resource protection.

Priority Planned Actions:

- When row crop outgrants come up for renewal, review Soil and Water Conservation plans for compliance with all applicable natural resource requirements. Ongoing. [Also applies to Section 4.7.2, first objective.]

- Provide periodic inspection of all outgrants, including row crops, and implement an effective action plan to address any violations. Ongoing.

- Ensure all present and future Base Orders will address the activities of outgrantees, including row crop and grazing leases, as appropriate. Ongoing. [Also applies to Section 4.10.1.]

- Evaluate row crop activities on Base to ensure they are properly integrated with natural resource management efforts. 2002.

- Expand the Base's Environmental Compliance Evaluation process to include all real estate tenants aboard Camp Pendleton. 2003.

- Develop a Standard Operating Procedure addressing specific environmental compliance actions required by all outgrantees, including row crops, issued aboard Camp Pendleton. 2005. [Also applies to Sections 4.10.1; 4.10.3.]

4.10.3 Native Seed Collection

An undetermined amount of land is available for native seed harvesting. Private contractors have commercially harvested seeds from native plants on Camp Pendleton since 1988. Native seeds have commercial value as stock for native vegetation restoration programs and for ornamental landscaping. In addition to gaining revenue from the commercial sale of the seeds, seeds are reserved for Camp Pendleton to use for restoration purposes. The use of seeds from the Base helps ensure a genetic stock that is adapted to the environmental conditions of the area and reduces site restoration costs.

Over 200 species are approved for harvest with a species list provided to the contractor. No more than 30% of the annual seed crop of any tree, brush, forb, or grass species in any individual location is harvested each year. All seed harvesting is done by hand and/or with hand carried vacuum type devices. Mechanical harvesting is not allowed. No mechanical injury to plants is allowed. The harvesting of threatened, endangered, or proposed threatened/endangered species is regulated by the U.S. Fish and Wildlife Service and by Base policy.

OBJECTIVE: Ensure the long term viability, compatibility, and fair-market value of the seed collection leases, in conjunction with the military mission and natural resource protection.

Priority Planned Actions:

- Provide appropriate oversight to native seed collection efforts on Base. Ongoing.

- Develop a Standard Operating Procedure addressing specific environmental compliance actions required by all outgrantees, including row crops, issued aboard Camp Pendleton. 2005. [Also applies to Sections 4.10.1; 4.10.2.]

Other Planned Action:

- Conduct study to ensure that current seed collection methodologies do not impact natural resources on Base. *

4.11 FIRE MANAGEMENT

The overriding goal of fire management on Base is to: "Protect life, property, and natural ecosystem functioning and diversity, while maximizing training opportunities and minimizing total cost" (MCB Camp Pendleton 1998). The high fire ignition frequency at Camp Pendleton (Minnich 1983) likely represents the single greatest influence on natural resources on Base (MCB Camp Pendleton 1998). The frequency is influenced by three factors: (1) frequent ignition sources from weapons firing, explosions, and pyrotechnic devices; (2) biological and climatic conditions conducive to fire in the late summer and fall; and (3) large areas of open space with abundant extremely dry vegetation.

To address fire management issues, Base Order P11320.13D (*Fire Protection Regulations and Instructions*) was implemented in 1992. Subsequently a Fire Management Plan (FMP) was developed. An update of the FMP (entitled W*ildland Fire Management Plan Update*, MCB Camp Pendleton 1998), developed jointly with the USFWS, was recently completed. The FMP is based on the development, implementation, and oversight of a proactive strategy focused on valuation and prioritization of Base resources. The 1998 FMP strategy seeks to balance military training requirements with protection of natural resources, in combination with fiscal considerations.

Wildland fire on Camp Pendleton is a continual challenge to land managers and firefighters, especially in the context of many sensitive and federally protected natural resources. As part of the adaptive management foundation for the Wildland Fire Management Plan (MCB Camp Pendleton 1998), a follow-up program of field studies (Fire Studies program) was designed to address data gaps and to validate and support recommended management strategies associated with the effects of wildland fire on sensitive natural resources. Examples of some of the strategies recommended in the Wildland Fire Management Plan that were recently investigated in the Fire Studies program included: (1) controlling patch size and maximizing edge habitats; (2) maximizing seed banks of native, fire-following annuals by reducing the fire frequency and intensity; (3) buffering riparian drainages from excessive fire frequency and nonpoint source pollution; and (4) improving age class structure of shrub communities. Research conducted from 1997 to 2000 by Tierra Data Systems (MCB Camp Pendleton 2001) has contributed to the Fire Studies program.

Camp Pendleton's Fire Department is actively engaged in regional planning and partnering to the mutual benefit of the Base and local, regional, and national agencies. In addition to providing personnel and equipment to assist in emergency wildfires throughout the region, Fire Department staff regularly provide professional expertise in fire management planning and in personnel training. The following examples highlight some of the ways in which the Camp Pendleton Fire Department has contributed to, or is involved in, local, regional, and national partnering efforts:

- Federal Wildland Fire Policy Review Working Group and the National Wildfire Coordinating Group. Camp Pendleton's Fire Chief acts as the DoD representative to the Federal Wildland Fire Policy Review Working Group and the National Wildfire Coordinating Group, which were established to develop and implement fire management policy for use on all federal lands.

- Wildland Fire Suppression Training Support. Camp Pendleton's Fire Department annually host two weeks of wildland fire suppression training for US Forest Service personnel and all other regional cooperating agencies.

- Wildland Fire Suppression Mutual Aid Agreements. Camp Pendleton's Fire Department provides personnel and equipment, as available, as part of mutual aid agreements with local, regional and national with members, as part of Interagency Incident Management Teams. Camp Pendleton's Fire Chief was an Incident Commander in Los Alamos, New Mexico Fire (*Cerro Grande Incident*) during May and June 2000.

- Camp Pendleton's Fire Management Plan. Camp Pendleton's Fire Management Plan was developed in cooperation with the USFWS and is being viewed by several DoD installations and National Forests as a potential regional model.

- Naval Weapons Station Fire Management Plan. Camp Pendleton's Fire Department is currently assisting Naval Weapons Station, Seal Beach Annex personnel (and their contractors) in development of a Fire Management Plan that is complementary to Camp Pendleton's new Fire Management Plan and strategy.

- Santa Ana Mountains Fire Alliance and the San Diego County Fire Safe Council. Camp Pendleton's Fire Department is a member of the Santa Ana Mountains Fire Alliance and the San Diego County Fire Safe Council.

- San Diego County Fire Service Working Groups. Camp Pendleton's Fire Department personnel are active around San Diego County in several fire service working groups to help ensure the availability of, and ready access to, up-to-date information on fire incidents and fire-related land management issues on Base.

- Regional Fuels Management and Fire Resource Allocation Planning. Camp Pendleton's Fire Department is working with the Cleveland National Forest and Orange County Fire Authority on fire management issues that integrate both fuels management and fire resource allocation planning.

- Fire Department Local Mutual Aid Memorandum of Understanding. Camp Pendleton's Fire Department has established a MOU with all fire agencies in San Diego County, the Orange County Fire Authority, the California Department of Forestry & Fire Protection, U.S. Forest Service, San Onofre Nuclear Generating Station, Cal Trans, and California Highway Patrol for providing mutual aid, when requested.

- Fire Management Equipment Field Testing and Evaluation. Camp Pendleton lands have been instrumental in the testing and development of the utility and applicability of Type-1 Helicopters (large Heli-tankers) as an initial attack resource on wildfires. The first Type-1 initial attack Helicopters were stationed and tested for three years at

Camp Pendleton. Results of this research has resulted in the placement of initial attack type I helicopters throughout southern California. Camp Pendleton's Fire Department, in conjunction with the program sponsor, California's Department of Forestry and Fire Protection, also hosted and coordinated research and development of the "*Operation Fire Stop II*" project. This joint effort was designed and initiated to test and evaluate new, 21st century wildfire fighting equipment.

GOAL: Implement recommendations from the 1992 plan and incorporate information obtained from the Fire Management Plan Risk Assessment conducted by REM & Associates (1994).

GOAL: Manage fire consistent with training needs and safety.

4.11.1 Pre-Suppression

Conditions that lead to high fire frequencies on Base cannot be eliminated. Therefore, pre-suppression measures are an essential mission support component of the Fire Management Program. Pre-suppression measures include the implementation of the Fire Danger Rating System (FDRS), maintenance of fuel/firebreaks and access roads, and application of controlled burning.

The Fire Danger Rating System consists of a color-coded notification system that indicates the fire danger level and programmatic instructions that identify restrictions on activities with fire generating potential (Table 4-4). Fire danger ratings are established daily from a combination of weather data, fuel load, Base activity level, and fire fighting resource availability. (Ratings may be further adjusted within a given locality for the added protection of sensitive natural resources.) Fire hazard conditions are monitored throughout the day by the Base's Fire Department, in cooperation with Range Control, and through intermittent range inspections.

An essential component of fire prevention on Base is fuels management. The management of fuels can help prevent as well as assist in the control of fires that do start. Pre-suppression fuels management involves the maintenance of firebreaks and fuel breaks to limit or slow the spread of fire. The Base has established an extensive network fire/fuel breaks, totaling nearly 1,300 acres over approximately 186 linear miles.

Another important pre-suppression fuels management measure involves the use of controlled burns. The Fire Department submits an annual burn plan (which includes all controlled burns) for review by the AC/S ES to ensure that these pre-suppression fire management actions are consistent with natural resource management goals and the San Diego County Air Pollution Control District's Smoke Management Program. All controlled and training burns are coordinated with and permitted by the San Diego County Air Pollution Control District.

OBJECTIVE: Minimize the risk of adverse impacts from wildfires and fire management practices.

Priority Planned Actions:

- Provide natural and cultural resource technical services to the Camp Pendleton Fire Department to support their fire management planning efforts. Ongoing. [Also applies to Sections 4.11.2; 4.13.]

- Conduct pre-suppression measures (e.g., controlled and prescribed burning) to help reduce the fuel load while managing for sensitive natural resources. Ongoing.

- Provide wildland fire management training to natural resources staff responsible for supporting wildland fire management on the Base. Ongoing. [Also applies to Sections 4.11.2; 4.11.3.]

- Annually update fuel load hazard mapping. Ongoing. [Also applies to Section 4.2.1.]

- Schedule and prioritize prescribed burns for resource management and fire suppression. Ongoing.

- Identify controlled burn or other brush management areas that will be valuable for maintaining or enhancing mosaic and diversity of vegetative age classes and enhance wildlife diversity. This will compliment the Camp Pendleton Wildland Fire Management Plans and Uplands Ecosystem Conservation Plan. Ongoing. [Also applies to Section 4.4.1.]

- Restore, using best management practices, firebreaks and roads that are no longer needed. Ongoing. [Also applies to Section 4.11.3.]

- Develop a set of programmatic instructions/guidelines in coordination with the Fire Department for use during wildfire suppression activities. 2002. [Also applies to Section 4.11.2.]

- Prepare jointly with the Fire Department, Standard Operating Procedures for annual maintenance of the Base's fuel breaks, firebreaks, and access roads. 2002.

- Validate, and revise where necessary, the current fire model. 2002.

- Evaluate present firebreaks needed to support the Wildland Fire Management Plan. 2002. [Also applies to Section 4.11.3.]

- Develop a fuel loading report that identifies high hazard areas. 2002.

- Develop a GIS based vegetation age class distribution map of the Base that shows levels of fuel loading. 2002. [Also applies to Section 4.2.1.]

TABLE 4-4. Fire Danger Rating System.

Fire Danger Rating	Caution to be Exercised	Necessary Precautions	Hazard
BLUE 0-30	Use normal caution.	Any type of ammunition may be used with care. Smoking is permitted.	LOW
GREEN 31-40	Use normal caution. Fires will start very easily.	Any type of ammunition may be used with care. Smoking is permitted.	MODERATE
YELLOW 41-60	Use extra caution. Fires will start very easily.	Yellow is the beginning of the high danger period. Any type of ammunition may be used on ranges and within impact areas. Smoking is permitted only in cleared areas or on firebreaks. The use of pyrotechnics, demolitions, and heat/flame producing devices within maneuver areas will be limited as much as possible to cleared areas or areas previously burned for that purpose.	HIGH
ORANGE 61-80	Use extreme caution. Fires are very hard to control.	Firing will be permitted at all times on all ranges and within impact areas, unless restricted by the Impact Area Control Officer. Minimal use of pyrotechnics, demolitions, and heat/flame producing devices, including blanks, is allowed within maneuver areas; however, their use is restricted to cleared or previously burned areas only. Smoking is permitted only in cleared areas and on firebreaks.	VERY HIGH
RED 81-100	Flash condition. This is the highest class of fire danger. Fires started are practically impossible to extinguish and usually continue until danger rating conditions improve or they burn themselves out. The utmost caution must be exercised at all times with fire producing agents and devices.	The firing of high explosives, pyrotechnics, incendiaries, or other ammunition likely to cause fires is prohibited unless specifically authorized by the Base Training Facility Officer. Authorized firing units will be advised as to the status of the range or impact area in question by the Impact Area Control Officer should a change in the fire danger rating occur. **The Fire Chief can authorize keeping the lower elevation training areas open because of the cooling effect of fog. If kept open, the Fire Chief will enhance Initial Attack capabilities to the area in the event of a wildland fire.** Firing units will exercise maximum attention to the observance of range fans and other pertinent precautions to prevent fires of any nature from starting. Smoking will be permitted only under strictly supervised conditions and in fire-safe areas. The use of any type of training/live ordnance, heat or flame producing devices (heaters, welders, stoves, or open fires) in maneuver areas is strictly prohibited.	EXTREME [a]

[a] These ranges are closed during extreme rating: Door Gunner 1, Door Gunner 2, 401 Impact Area. These training areas are closed during extreme rating: Juliett, Lima, Hotel, Golf, Romeo One, Alfa Three, Bravo One, Bravo Two, Yankee, Charlie, Delta, Echo, Foxtrot, India, East of India Firebreak and North of West/East Firebreak.

4.11.2 Suppression

Fire suppression occurs throughout the Base as needed, mostly between the months of May and November. Fire suppression activities include: fire line construction, firing out, direct suppression, and "mop-up" activities. Where possible, fire vehicles use existing roads or firebreaks; however, suppression actions may include driving off road, including over burned areas. Past fire patterns (Figure 4-1) indicate the location of the majority of the fire suppression activity on Base.

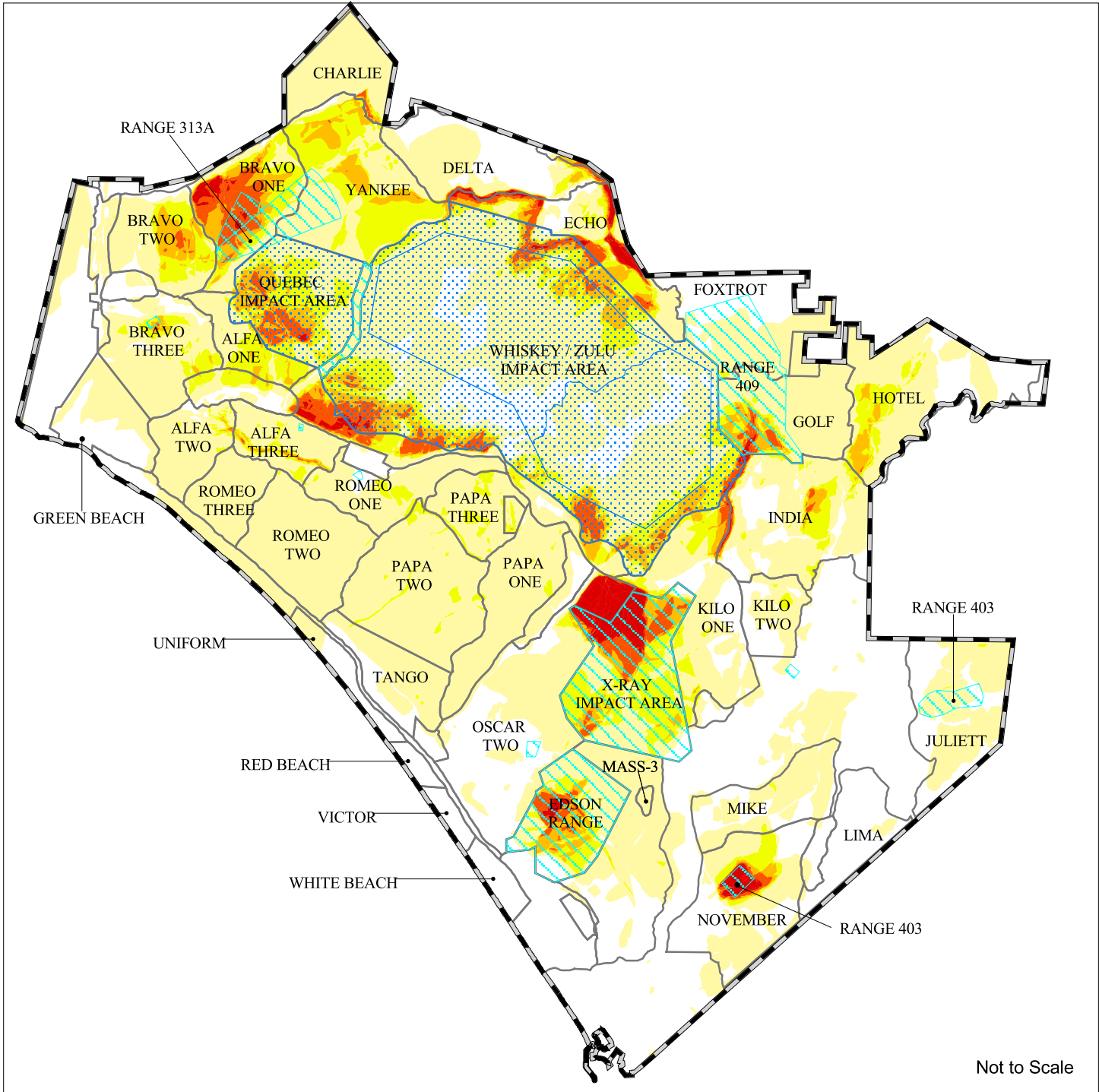
In many cases, existing paved and dirt roadways can be used as fire lines to contain a wildfire. The location of sensitive habitats or listed species is considered in carrying out all forms of fire suppression actions, especially if an area is to be bulldozed or hand cut for a fire line. Personnel from the Fire Department contact the AC/S Environmental Security when sensitive natural resources (as identified on the Base Environmental Operations Map) may be affected by suppression activities. A natural and cultural resource representative from the AC/S Environmental Security Resource Management Division responds to such calls and provides guidance to the Incident Commander on avoidance and minimization of impacts to listed species and occupied habitats. Fires of five acres or larger are mapped.

Fire suppression is conducted on Base using in-house resources with additional cooperative support from local and regional firefighting agencies. In-house firefighting resources include 10 standard wildland firefighting vehicles (5-ton, 6-wheel drive); 10 light attack vehicles (High Mobility Multipurpose Vehicle [HMMV] and/or four-wheel-drive pickup trucks mounted with water tanks); 2 water tenders (ten-ton, six-wheel drive); and 4 D-8 or equivalent military bulldozers. Cooperative resources include air tankers, helicopters, hand crews, engines, and bulldozers.

The Base Fire Department has cooperative resource agreements in place with the U.S. Forest Service (USFS), California Department of Forestry, and both Orange and San Diego County firefighting agencies to effectively support suppression actions on the Base. However, these resources are not always available due to their commitment to other regional fire activities taking place at the time of request.

In addition, the Base utilizes air support firefighting resources when necessary. While very effective, such resources are also very costly. As a result, they are requested only when the resource being protected justifies the cost. Primarily, they are requested when there is a high risk that the wildfire might burn off the Base.

OBJECTIVE: Minimize the risk of adverse impacts from wildfires and fire management practices.



Camp Pendleton Boundary

Training Area Boundary

Central Impact Areas (Restricted Access)

Live Fire (Non-Dud Producing) Impact Areas

Number of fires per area (1973-1998)*

- 1 - 3
- 4 - 5
- 6 - 7
- 8 - 10
- 11 - 17

* Fire data incomplete and underrepresented within the Central (Dud-Producing) Impact Areas

Figure 4-1
Fire Frequency and Spatial Distribution (1973-1998)

N

Map Source:
AC/S Environmental Security
GIS Branch
October 2001

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Priority Planned Actions:

- Have a qualified natural and cultural resource representative respond to all wildfires when called by the Fire Department. Provide on-the-ground natural and cultural resource expertise to help avoid and minimize adverse impacts from fire suppression activities. Ongoing.

- Provide natural and cultural resource technical services to the Camp Pendleton Fire Department to support their fire management planning efforts. Ongoing. [Also applies to Sections 4.11.1; 4.13.]

- Provide wildland fire management training to natural resources staff responsible for supporting wildland fire management on the Base. Ongoing. [Also applies to Sections 4.11.1; 4.11.3.]

- Develop a set of programmatic instructions/guidelines in coordination with the Fire Department for use during wildfire suppression activities. 2002. [Also applies to Section 4.11.1.]

4.11.3 Post-Suppression

Post-suppression actions include, but are not limited to: erosion control (reseeding, mulching), exotics control, and increased programmatic protection of site. Post-suppression fire management actions generally occur where a fire has burned occupied habitat or where erosion may become a problem. These activities are implemented to reduce or eliminate potential long term negative effects of fire and are intended to reduce the effects of direct and indirect suppression actions. Post-suppression activities are done only in unusual situations, usually where there is a direct impact or an immediate threat to federally listed threatened and endangered species or their habitat. Post-fire seeding may occur under limited conditions, as determined by the AC/S ES.

OBJECTIVE: Minimize the risk of adverse impacts from wildfires and fire management practices

Priority Planned Actions:

- Update the GIS database with wildland fire data annually. Map all wildland fires outside of impact areas that are greater than five acres and identify impacts to threatened and endangered species. Ongoing. [Also applies to Section 4.2.3.]

- Establish test plots to understand best management practices for natural resource recovery after wildland fire impacts. Ongoing. [Also applies to Sections 4.5.3; 4.6.1; 4.7.2, first objective.]

- Where possible use native seed stock if conducting post-fire reseeding. Ongoing. [Also applies to Sections 4.6.1; 4.7.2, second objective.]

- Provide wildland fire management training to natural resources staff responsible for supporting wildland fire management on the Base. Ongoing. [Also applies to Sections 4.11.1; 4.11.2.]

- Restore, using best management practices, firebreaks and roads that are no longer needed. Ongoing. [Also applies to Section 4.11.1.]

- Establish monitoring plots to track natural resource recovery after wildland fire impacts. 2002. [Also applies to Section 4.2.3.]

- Develop procedures for post-fire and post-fire suppression land restoration measures in selected areas. 2002.

- Evaluate present firebreaks needed to support the Wildland Fire Management Plan. 2002. [Also applies to Section 4.11.1.]

4.12 ENVIRONMENTAL PLANNING

Environmental planning and the provision of technical support for projects on Camp Pendleton are important for ensuring the sustainability of natural resources to support the military mission. Due to the wide variety of land uses occurring on Base and the number of Base organizations involved in land use decisions, Base environmental planning needs to be comprehensive and integrated. Moreover, the environmental portion of the planning process requires compliance with several interrelated laws and regulations designed to ensure that federal agencies assess, in detail, the potential environmental impacts of their actions that could significantly impact the quality of the environment. Camp Pendleton programs, plans (e.g., training management plans, master plans, pest management plans), and projects (e.g., construction of new ranges, roads, buildings) must be in compliance with natural resource laws and regulations and integrated with natural and cultural resources programs, plans, and projects. Failure to anticipate environmental planning requirements can cause project delays that can cost the government both financially as well as in staff time and missed training opportunities. Environmental site review conducted late in the planning process, particularly due to endangered species and cultural resource mandates, can cause uncertainties and delays in project implementation. However, conducted early in the design and site selection process it can become a positive and flexible tool rather than a negative one.

Environmental planning on Camp Pendleton occurs on different levels and scales (e.g., short term, project specific versus long term, regionwide). Program or project specific planning, which is relatively short term, is typically integrated with natural and cultural resource management via the National Environmental Policy Act process. Camp Pendleton's NEPA process provides a mechanism to help ensure that adverse impacts from specific projects and actions are avoided or minimized and that planning efforts are consistent with natural resource laws and regulations. Camp Pendleton's NEPA process is instrumental to the

successful integration of Base activities and programs. Initial planning stages of proposed actions must be integrated with the NEPA process "to ensure that planning and decisions reflect environmental values, to avoid delays later in the process, and to preclude potential conflicts" (32 CFR Ch.1, Part 188).

Beyond project specific planning, long term and master planning help to guide natural resource and land use integration through time, ensuring that Base activities (including development projects, recreation programs, natural resource management initiatives, etc.) are consistent with natural resource management requirements, goals, and objectives, and that those goals and objectives are consistent with the military mission. Long range, basewide planning provides an opportunity to evaluate the integration of, and consistency among, planned actions.

Base planning is integrated with the ECE process (Environmental Inspection and Compliance, Section 4.0.2.3) to assist commanders in identifying and correcting compliance gaps. The Commandant of the Marine Corps has issued policy which stresses the need to anticipate environmental issues and "take affirmative steps" to assure compliance (USMCB White Letter 9-91). He brings the responsibility and need to limit liability back to the planning process by suggesting the following steps, among others:

- Consider environmental issues during planning;
- Clearly designate responsibility for compliance;
- Provide staffing, organization, and training of those responsible for compliance; and
- Document environmental management efforts.

The Resource Planning Division of AC/S Environmental Security administers the NEPA process for MCB Camp Pendleton and the MCAS Environmental Office administers the NEPA process for MCAS Camp Pendleton. These offices have the duty to ensure that NEPA compliance has been accomplished and that the appropriate level of documentation has been prepared for new projects or actions and some continuing actions. Natural resource management support of Base projects includes (1) coordination of and participation in the NEPA process (e.g., review of proposed projects by staff biologists and planners, assistance in the development of alternatives that may avoid and minimize adverse impacts to natural resources and the environment), (2) consultation with environmental regulatory agencies, (3) management and integration of compensation and mitigation actions (e.g., identification of mitigation sites, development of mitigation banks, monitoring past mitigation sites), and (4) post-NEPA review and follow up.

Major laws governing potential impacts on federally listed threatened or endangered species, wetlands and migratory birds are the ESA, CWA, and MBTA, respectively. Following is a summarization of the requirements of these Acts to facilitate consideration early in the planning process and provide an understanding of areas that will be reviewed by Base and regulatory agency staff.

- Endangered Species Act (ESA): When evaluating actions potentially affecting threatened or endangered species, planners (e.g., Public Works Department, AC/S

O&T, AC/S MCCS, AC/S ES) must take into account the requirements of the ESA and the time lines needed for compliance. Formal consultations with the USFWS pursuant to Section 7 of the ESA (50 CFR 402) are required prior to federal agencies authorizing, funding, or implementing proposed actions that may affect a threatened or endangered species or its critical habitat. Preparation of a Biological Assessment is required before initiation of formal consultation.

The time required to prepare a Biological Assessment depends on the complexity of the proposed action and the magnitude of the potential effects on the species of concern. Potential requirements for additional information (e.g., surveys) can extend the time line for completion of the Biological Assessment. Anywhere from a few weeks to over a year may be required to finalize a Biological Assessment before it can be submitted to the USFWS as part of the request to initiate formal consultations. Once formal consultations are initiated, the consultations can be lengthy. Formal consultations involve up to a 90-day consultation period, and an additional 45-day period for the USFWS to prepare a Biological Opinion (135-day total). Either the lead agency or USFWS can request an extension of the formal consultation period but such extensions require mutual agreement. Conditions that may require an extension include complex issues or circumstances for which additional data (e.g., surveys) may be needed in order to avoid a jeopardy decision in the Biological Opinion.

A Biological Opinion is the USFWS opinion resulting from the formal Section 7 ESA consultation. It is a written statement from the USFWS regarding its opinion on the proposed federal action and a summary of the information upon which the opinion is based, including how the proposed federal action affects the species or its critical habitat. The Biological Opinion provides nondiscretionary Reasonable and Prudent measures that must be implemented in conjunction with a proposed action to avoid or minimize impacts. The USFWS also provides nonbinding conservation recommendations as part of the Biological Opinion.

A Biological Opinion is required for actions that may affect a threatened or endangered species so as to avoid violations under Section 9 of the ESA. Section 9 of the ESA prohibits the take of a threatened or endangered species. A take includes the direct killing, harming, or harassing of a species, or destruction of habitat that may be important for the species' survival or recovery. The term “harass” in this definition has been further defined to mean “…an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering (50 CFR 17.3).”

Part of a Biological Opinion is the issuance of an incidental take that authorizes take as long as it does not violate the terms and conditions established in the Biological Opinion. Terms and conditions can involve additional costs relative to mitigation requirements, which may include compensation for lost resources, minimization of, and avoidance of impacts on threatened or endangered species or critical habitat. Such potential costs need to be considered as part of project planning and construction.

Endangered Species Act consultations are accomplished for Camp Pendleton through the AC/S Environmental Security for MCB and the Environmental Officer aboard MCAS. For proposed nonmilitary actions on Camp Pendleton, the action proponent bears the responsibility for preparation of a Biological Assessment along with the documentation necessary for execution of consultation/conferencing requirements. Species and habitat information possessed by Camp Pendleton can be made available to action proponents; however, the proponent shall accomplish any needed supplementation or field verification. For nonfederal proposed actions on Base, Camp Pendleton, as a federal agency, is required to complete a Section 7 consultation/conference with the USFWS *prior to* authorizing or funding a proposed action which may affect a proposed or listed threatened or endangered species. This is Camp Pendleton's requirement regardless of any requirement the action proponent may or may not have regarding such species. All approvals will be conditioned upon the action proponent's commitment to fund and/or implement the Reasonable and Prudent Measures with associated terms and conditions that result from this consultation/conference procedure.

Camp Pendleton has developed Section 7 consultations that programmatically address ongoing training, routine and reoccurring maintenance, and a number of specific projects. These programmatic consultations both eliminate the requirement for individual consultation on activities or projects when programmatic instructions are followed and establish a process for determining specific mitigation requirements and criteria for reinitiating consultation on large projects. An activity/consultation classification system was included in the Riparian BO (USFWS 1995a) and proposed Biological Assessment of Upland Habitats to: (1) manage the conduct of future consultations; (2) reduce staffing requirements; (3) provide a systematic approach to deal with future proposed projects, activities, and operations; (4) increase the Base's mission flexibility; (5) satisfy Section 7(e)20 requirements of the ESA for future programmatic consultations; and (6) define the level of formal consultation required for activities and projects.

- Clean Water Act: Clean Water Act permitting for Marine Corps actions on MCB Camp Pendleton are processed by the AC/S Environmental Security and by the MCAS Environmental Office for actions on MCAS Camp Pendleton. Preparation of permit application and associated information, wetland delineation, and other applicable information is the responsibility of the action proponent. Permitting necessary for non-Marine Corps proposed actions shall be accomplished and funded by the action proponent in coordination with Camp Pendleton staff. Completion of the regulatory permitting process is required for all federal and nonfederal actions prior to receiving final approval to implement the requested action.

  For proposed actions involving navigable waters, including some wetlands, the requirements of the CWA need to be considered. The CWA contains specific provisions for the regulation of the disposal of dredge soil and materials within navigable waters. Permits are required under Sections 401, 402, and 404 of the CWA for proposed actions that involve wastewater discharges and/or dredging/placement of

fill in regulated wetlands or navigable waters. These permits are required *prior to* the initiation of proposed actions.

Section 404 of the CWA addresses the discharge of dredge or fill material into waters of the United States, including some wetlands (definitions at 40 CFR 230.3 [s] and [t]). The term "waters of the United States" is broadly defined to include navigable waters (including intermittent streams), impoundments, tributary streams, and wetlands. In general, wetlands are areas inundated or saturated by surface or ground water to the extent that they support vegetation adapted for saturated soil conditions (e.g., vernal marshes, and vernal pools). However, some wetlands do not meet the definition of "navigable waters" and are not regulated under the CWA. A discharge is any material that results in a change in the bottom elevation of a water body or regulated wetland, including grading, road fills, stream crossings, building pads, and flood and erosion control on stream banks. Regulatory authority has been delegated by the EPA to the U.S. Army Corps of Engineers for Section 404. Nationwide and individual permits are options for meeting the requirements of Section 404.

The ACOE has developed a series nationwide permits that pre-authorize certain minor discharges provided they meet certain conditions (e.g., construction of outfall structures, backfill or bedding for utility lines, fill for bank stabilization, and minor road crossings). Use of most nationwide permits requires review by the ACOE and possibly other federal agencies. Notification of the ACOE is usually required, and applicants must meet conditions outlined in the regulations and ensure the proposed project does not conflict with other federal laws (e.g., ESA, NEPA). Discharges that do not meet the conditions of a nationwide permit require an individual permit.

The individual permit process is much more complex and time consuming than the nationwide permit program. Typically the application process involves a pre-application meeting (if requested), permit application process, the posting of a public notice to allow for public comment, and a final decision by the ACOE in which the ACOE indicates its readiness to prepare an Environmental Assessment (or cause one to be prepared), Public Interest Review, and 404(b)(1) Evaluation. If the conclusion is that the action will cause significant impacts, then the ACOE must prepare an EIS (or cause one to be prepared). Further, all ESA requirements must be fulfilled before a permit can be issued.

Section 402 of the CWA addresses requirements for storm water discharges into natural drainages and is administered by the U.S. Environmental Protection Agency. Section 401 addresses water quality issues and requires issuance of a Water Quality Certification by the Regional Water Quality Control Board before a Section 404 Permit can be issued. The state may charge a fee for Section 401 permitting, although waivers can also be issued.

The CWA also requires federal agency consistency with state nonpoint source pollution management plans. Nonpoint source pollution results from ground disturbing actions such as construction, military training, and firebreak construction. Marine Corps' policy is to support the development and implementation of nonpoint

source pollution management programs that ensure water quality protection. This is typically accomplished through the use of Best Management Practices. As defined by MCO P5090.2 (HQMC 1998): "...BMPs are practical, economical, and effective management or control practices that reduce or prevent water pollution or adverse impacts to natural resources." BMPs are applied as a system of practices based on site specific conditions rather than a single practice. BMPs are usually prepared by state agencies for land-disturbing activities related to agriculture, forestry, and construction.

- Executive Orders - Wetlands and Floodplains: In addition to implementing requirements of the CWA, Camp Pendleton also must administer Executive Order 11990, which directs all federal agencies to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands as well as to preserve and enhance the beneficial values of wetlands. Under the NEPA requirements section of MCO P5090.2 (HQMC 1998), all proposed land uses that would impact the quality or quantity of tidelands or freshwater wetlands are to be evaluated with the a minimum of an Environmental Assessment. In a similar manner, Camp Pendleton complies with Executive Order 11988 that directs federal agencies to provide leadership in avoiding direct or indirect development of floodplains, as well as to restore and preserve the natural and beneficial values of floodplains.

- Migratory Bird Treaty Act: The Migratory Bird Treaty Act is an international agreement between the United States, Canada, and Mexico that protects designated species of birds. Virtually all birds are protected under the MBTA (286 of the 315 observed on Camp Pendleton), see Appendix O. A complete list of all species of all migratory birds protected by the MBTA can be found at 50 CFR 10.13. The MBTA controls the taking of these birds, their nests, eggs, parts, or products. As part of planning and/or approving construction, re-construction, and maintenance actions, steps need to be taken to avoid impacts on migratory birds, their nests, and young. Wording needs to be placed in all contracts and work orders to prevent work delay costs to the government that may result from the presence of bird nests in work areas. The AC/S Environmental Security, Natural Resources Department, can provide contractual language prepared for and approved by the Navy for construction contracts on Camp Pendleton.

  Federal agencies must obtain permits to take, possess, and transport migratory birds for scientific collecting and for the control of depredating birds or birds that pose a threat to human health and safety (referred to as "conflict management activities"). Killing of migratory birds is not permitted unless authorized to do so in the permit. Permits are not required for incidental takes of migratory birds due to training.

  A recent Executive Order (EO 13186) directs each federal agency taking actions having or likely to have a negative impact on migratory bird populations to work with the U.S. Fish and Wildlife Service to develop an agreement to conserve those birds. The protocols developed by this consultation are intended to guide future agency regulatory actions and policy decisions; renewal of permits, contracts, or other

agreements; and the creation of or revisions to land management plans. In addition to avoiding or minimizing impacts to migratory bird populations, agencies will be expected to take reasonable steps that include restoring and enhancing habitat, preventing or abating pollution affecting birds, and incorporating migratory bird conservation into agency planning processes whenever possible.

The specific requirements of Executive Order 13186 will be detailed in an MOU by and between the DoD and USFWS. DoD has two years to complete the MOU and is developing guidance for this interim period. The thrust of the guidance is to comply with the intent of the Executive Order, ensuring where installation activities may result in adverse impacts to migratory birds, such impacts are considered, and where appropriate, mitigated through NEPA planning processes.

GOAL: Integrate natural resource requirements with master planning and planning of mission activities to minimize unnecessary future impacts to mission.

GOAL: Initiate NEPA and environmental planning early enough in the project planning process to reduce delays in the schedule of proposed actions.

GOAL: Fully evaluate and document impacts of proposed actions and integrate them with environmental and natural resource programs when impacts require mitigation.

GOAL: Streamline environmental assessment procedures to enhance the mission-related use and stewardship of the Base's natural resources.

4.12.1 NEPA Review

The primary planning tool for the evaluation of projects and actions potentially affecting the environment and for the coordination of these projects and actions with Camp Pendleton's environmental management programs is the National Environmental Policy Act. NEPA is the basic national charter for the protection of the environment (HQMC 1998) and requires federal agencies to assess and document, in detail, the potential environmental impacts of their actions that could significantly affect the quality of the environment. NEPA is intended to help decision makers make informed decisions and take actions that protects, restores, and enhances the environment. In brief, the NEPA process requires that the Base: consider the environment in decisions concerning potential individual and cumulative impacts; make diligent efforts to inform and involve the public at appropriate stages in the decision making process; develop and evaluate less environmentally damaging alternatives to potential projects; and support informed decisions with quality documents.

NEPA requires a detailed statement of significant environmental impacts of major federal actions. For example, an action may be considered significant if it has a long term impact or potential risk because of its effect on a species protected under the federal ESA. The process identifies reasonable alternatives to proposed actions that might have less or no

environmental effect. Individual and cumulative impacts must be considered. The following three-tiered approach is used to document impacts:

- Categorical Exclusions are used for actions that do not individually or cumulatively have a significant effect on the human environment and therefore do not require preparation of an Environmental Assessment (EA) or Environmental Impact Statement (EIS).

- An EA is the analysis to be completed when the government is uncertain as to whether an action will significantly affect the environment or whether the action is controversial; the result of an EA is either a Finding of No Significant Impact or a requirement to complete an EIS.

- An EIS is a full-disclosure document that presents a full and complete discussion of significant impacts, informing the public and decision makers of reasonable alternatives to the proposed action.

Camp Pendleton has established Base specific regulations to guide NEPA procedures (BO 5090.2A) that lay out roles and responsibilities and the procedures to be followed to ensure potential impacts to the environment are assessed, documented, and considered before the decision is made to proceed with an action or project. This Base NEPA Order established a comprehensive program, with varying levels of decisional authority to Base entities, to ensure that all federal actions are conducted in compliance with NEPA. The Base Order identifies data needs and level of required NEPA documentation, clearly delineating responsibilities for environmental review. Camp Pendleton's NEPA documents incorporate natural and cultural resource programmatic and specific instructions as conditions for the conduct of projects and actions.
During the NEPA review process, the natural resource managers within these offices help to (1) identify potential adverse impacts from the project, (2) identify less damaging alternatives, (3) ensure that adequate mitigation is planned, (4) provide compliance with natural resource laws and regulations, and (5) maintain consistency with natural resource management goals and objectives. MCAS is developing a programmatic Environmental Assessment for infrastructure development and maintenance. This planning document will be based on the MCAS Master Plan and will provide "umbrella" NEPA coverage for MCAS facilities. NEPA analysis for future actions will be tiered from this Environmental Assessment.

Currently, the Resource Planning and Resource Management Divisions of AC/S ES utilize two databases to document and track NEPA and mitigation project activities. These databases are known as E-Trax and the "Mitigation Database," respectively. NEPA projects and mitigation are also tracked using GIS systems within AC/S ES and AC/S Facilities. The ultimate objective for NEPA project and mitigation tracking is to have a single, consistent interface for maintaining tracking data. The first phase of development of this new, integrated E-Trax system has been completed and is beginning to be utilized. Completion of the second phase, which integrates the mitigation tracking element, is contingent upon funding availability.

OBJECTIVE: Fully implement the NEPA review process to facilitate project planning and integrate project specific plans with overall Base land use and natural resource management plans.

Priority Planned Actions:

- During project and NEPA review, ensure that direct or indirect adverse impacts to federally listed species, critical habitat, floodplains, wetlands, and other sensitive resources are identified and avoided or minimized when possible. Ongoing. [Also applies to Section 4.3.1, second objective.]

- Clearly identify the project proponents/offices/positions accountable for project implementation and mitigation requirements for each new project. Ongoing. [Also applies to Sections 4.12.1, second objective; 4.12.3.]

- Contact off-Base interested and affected agencies and parties as soon as possible on projects with potentially significant environmental impacts, particularly if controversial. Ongoing.

- Provide NEPA and impact assessment training for designated NEPA personnel including public works and ROICC. Ongoing. [Also applies to Section 4.12.1, second objective.]

- Ensure all real estate leases and agreements, including renewals, are evaluated through the NEPA process. Ongoing.

- Ensure that all new activities with potential direct or indirect permanent impacts to federally listed species undergo NEPA review and are subject to the activity/consultation class system (as defined in the Estuarine and Beach Ecosystem Conservation Plan, the Riparian Ecosystem Conservation Plan, the Listed Upland Species Management Program, and their respective Biological Opinions). Ongoing. [Also applies to Section 4.12.2.]

- Prepare and regularly update a NEPA Handbook that clearly and simply outlines step-by-step Base procedures for the management and preparation of NEPA documents. Included should be a recommended format for Environmental Assessments and Environmental Impact Statements to facilitate contractor and in-house preparation of consistent documents. 2002.

OBJECTIVE: Improve the NEPA planning process in order to better facilitate project planning and integrate project specific plans with overall Base Master Planning, land use and natural resource management plans.

Priority Planned Actions:

- Track the early planning phases of future activities, including major training exercises, and construction projects in order to facilitate early awareness, implementation and compliance with programmatic instructions and early consultation with the Service if appropriate. Ongoing. [Compliance requirement of Riparian BO (Appx 4, p. 3)]

- Provide technical assistance to other Base offices before and after a proposed action is submitted for NEPA review. Ongoing.

- Provide NEPA and impact assessment training for designated NEPA personnel including public works and ROICC. Ongoing. [Also applies to Section 4.12.1, first objective.]

- Clearly identify the project proponents/offices/positions accountable for project implementation and mitigation requirements for each new project. Ongoing. [Also applies to Sections 4.12.1, first objective; 4.12.3.]

- Reinitiate Quarterly environmental planning meetings between MCB and MCAS. 2002.

Other Planned Actions:

- Seek to expand the use of Programmatic Categorical Exclusions to define categories of actions which experience has indicated will not individually or cumulatively have a significant effect on the human environment. ***

- Encourage each Base office to annually anticipate their projects or actions and seek yearly "programmatic" Categorical Exclusions for all projects that qualify. ***

- Complete the second phase of E-Trax development, testing, and implementation. [Also applies to Section 4.12.3.] ***

4.12.2 Consultations

It is Marine Corps policy that installations must comply with laws for the protection and management of natural resources (see legislative and regulatory drivers in Appendix B). To ensure compliance, Base projects and actions that may affect regulated resources require consultation with, and/or acquisition of required permitting documentation from, appropriate regulatory agencies. Natural resource managers at Camp Pendleton are routinely in communication with agencies such as the USFWS, ACOE, State of California Regional Water Quality Control Board, California Coastal Commission, and San Diego Air Pollution

and Control District.

To facilitate effective and efficient management of Base resources while ensuring regulatory compliance for ongoing programs and actions, programmatic consultations have been established in coordination with appropriate regulatory agencies. For example, the Base has consulted under Section 7 of the federal Endangered Species Act with the USFWS on ongoing activities and ecosystem conservation programs (Estuarine and Beach Ecosystem Conservation Plan and the Riparian Ecosystem Conservation Plan) within riparian and estuarine/beach habitats on Base. This consultation resulted in the Riparian BO (USFWS 1995a). The Base is currently in consultation with the USFWS for the corresponding Upland Habitat Biological Assessment and Listed Upland Species Management Program. Within all of these plans/documents are Consultation Class Systems (Table 4-2) for directing future consultations on Base projects. The purpose of this programmatic Class System approach is to: (1) satisfy Section 7(e)20 of the ESA requirements for future consultations, (2) provide a systematic method for dealing with future proposed projects in a consistent, predictable manner, (3) increase the Base's mission flexibility, (4) identify activities which require formal consultation with the USFWS, and (5) reduce staff time (for both the Base and the USFWS).

While formal consultations are required under many circumstances, natural resource managers often engage in informal consultations with regulatory agencies as well. Such informal consultations are integral to the continued assurance of compliance under varying circumstances, to facilitation of management planning and project support, and to building of positive working relationships with regulating agencies.

Apart from MCAS, which maintains its own environmental compliance staff, the AC/S Environmental Security serves as the lead organization for planning and addressing natural resource compliance issues such as wetland, endangered species, and air and water quality regulatory requirements. The Office of Water Resources also acts as a Base liaison with federal, state, and local conservation and public health officials and community interests regarding water resource management and protection.

OBJECTIVE: Assess and pursue the development of conservation agreements and/or programmatic consultations with regulatory agencies (e.g., USFWS, ACOE, etc.) to provide compliance with laws and regulations for Base actions.

Priority Planned Actions:

- Ensure that all new activities with potential direct or indirect permanent impacts to federally listed species undergo NEPA review and are subject to the activity/consultation class system (as defined in the Estuarine and Beach Ecosystem Conservation Plan, the Riparian Ecosystem Conservation Plan, the Uplands Conservation Plan, and their respective Biological Opinions). Ongoing. [Also applies to Section 4.12.1, first objective.]

4.12.3 Mitigation and Compensation

Natural resource managers provide project and mission support through the planning, implementation, integration, and monitoring of mitigation and compensation measures. Mitigation is lessening the adverse effects an undertaking may cause relative to natural resources. Mitigation can include avoiding the effect altogether; limiting the magnitude of the action; repairing, rehabilitating, or restoring the affected resource; reducing or eliminating the effect over time by conservation and maintenance operations during the life of the action; and/or compensating for the effect by providing substitute resources or environments (U.S. DoD 1996). In general, regulatory agencies' preferred order of performing mitigation is avoidance, then minimization, then compensation in kind, and then compensation out of kind.

To separately address the potential adverse effects caused by ongoing land use activities (e.g., training, maintenance, fire management, recreation), in the proposed management plan for federally listed species in upland habitats on Base (Uplands Biological Assessment), Camp Pendleton refined the definition of mitigation. The refined definition of mitigation refers to measures taken to offset potential adverse biological effects from actions that may have *permanent* direct or indirect impacts to federally listed species, critical habitat, or other regulated resource. Compensation refers to measures taken to offset potential biological effects from actions that may have *temporary* direct or indirect impacts to federally listed species, critical habitat, or other regulated resource. Temporary impacts from ongoing Base activities are inevitable. These impacts, in addition to being temporary, are impossible to quantify due to the almost infinite variations of personnel, equipment, transportation, and time/duration of training events. To minimize and compensate for such unavoidable, unquantifiable temporary impacts in upland habitats, the Base has proposed several basewide management initiatives, management plans and conservation plans. While some of these initiatives/plans may not be specific to a listed species, all resources on Base are expected to benefit either directly or indirectly from successful implementation of these programs.

As part of mitigation planning, careful consideration must be given to the siting of proposed actions and potential compensating mitigation relative to existing land uses and natural resources early in the planning process. As part of Camp Pendleton's ongoing efforts to avoid and/or minimize impacts to threatened or endangered species, vernal pools, other wetlands, and constrained regional habitat linkages, first consideration will be given to use of marginal or nonnative vegetation areas. This will, in turn, enable planners to reduce costs (in terms of funding, manpower, and time) to plan, obtain regulatory approvals, and implement proposed actions. Locating suitable mitigation sites on Camp Pendleton that will not conflict with military operation requirements is becoming increasingly difficult. Generally, mitigation requirements in compensation for impacts by nonmilitary actions on Camp Pendleton will be accomplished off of the Base. Further, Camp Pendleton cannot be used for mitigating the impacts of actions occurring off Camp Pendleton that affect natural resources (U.S. DoD 1996, paragraph F.1.i [3]). Persons planning and/or preparing mitigation actions need to be aware that military lands cannot be set aside as permanent environmental preserves. The DoD, and the Marine Corps in particular, must maintain the flexibility to adapt its defense mission to political and technological developments (U.S. DoD 1996, paragraph F.1.i [4]).

The type of mitigation proposed for a specific impact will be addressed on a case-by-case basis. The action proponent is responsible for ensuring that mitigation requirements for a proposed action are planed, funded, and implemented. As the action proponent typically does not have in-house expertise for conducting the biological elements of mitigation requirements, these actions are often accomplished through contractual agreements. The AC/S ES (Environmental Officer for the Air Station) oversees any mitigation actions that require restoration, enhancement, monitoring, etc. of the resources. Because the funding for MILCON projects is congressionally limited to use within a five year period, it is important to develop mitigation objectives that can be met within this timeframe.

Project specific requirements and details that are appropriate for a proposed action cannot be provided in this INRMP since such specifics must be tailored to each individual project and determined through applicable consultation and permitting processes in coordination with regulatory agencies. However, many elements of mitigation actions and planning are common to most situations. The following mitigation measures should be planned for all proposed actions unless a determination can be made, in consultation with Natural Resources Department (AC/S ES) staff, that they are not appropriate:

- Impact Avoidance and Minimization. The first step in mitigation planning should be avoidance of impacts. The primary purpose of mitigation is to lessen the severity of an action. Once avoidance has been implemented to its fullest extent, remaining impacts should be minimized. This must be the first step in the mitigation planning process because numerous regulatory authorizations require demonstration of maximum impact avoidance and minimization before authorization may be given. Avoidance and minimization of adverse impacts may involve modification of building design or orientation, adjustments to the exact siting, and monitoring activities carefully to avoid unnecessary and incidental resource damage. Limitations on the timing of activities are also often required for avoiding and minimizing adverse impacts to natural resources (e.g., to avoid behavioral disruptions during the breeding season for federally listed birds). Proposed actions must include requirements for impact avoidance and minimization measures as part of implementation of any proposed action. Measures which should be considered include: worker environmental protection briefings, signs, markers, protective fencing, exclusion fencing, biological monitoring, erosion and sedimentation prevention, noise baffling, and temporary impact restoration. These measures should be included as part of an Environmental Protection Section in all Standard Operating Procedures, work requests, and contracts effecting natural resource areas.

- Effects Analysis. Potential direct and indirect effects of a proposed action must be addressed when planning mitigation. Direct effects occur immediately upon impact of the action. Indirect effects have an impact at some point later in time. An example of indirect effects includes the case where use and maintenance of a new facility is likely to have an adverse effect beyond the building “footprint” following construction. Fencing may be necessary to prevent landscape maintenance and concentrated human foot traffic from damaging naturally occurring resources that were avoided by the construction of a building. Often, maintenance and safety considerations associated

with new or re-utilized facilities, such as wildfire fuelbreaks, are overlooked by planners and are not realized until the project is implemented. Such considerations must be treated as part of the initial project and mitigated accordingly. Some direct effects of a proposed action may be less tangible; a common concern is noise and nighttime lighting associated with construction. As a general rule, noisy construction activities need to be kept far enough away from noise sensitive threatened and endangered species such that the level in the occupied habitat varies little from background. Other examples include outdoor lighting that may require shielding, visual harassment by human activities and equipment operation, changes to wetland hydrology, and sedimentation from construction sites to wetlands. Often the temporary effects that may result from construction are avoided by performing work outside the sensitive breeding and growing seasons as presented in this planning guidance. Other effects that are likely to have a longer or permanent adverse effect must be mitigated.

- Endangered Species Act and Presence/Absence Determinations. Threatened or endangered species presence or absence determinations must be made using survey guidelines developed by the U.S. Fish and Wildlife Service or other means acceptable to them. Where no such guidelines or protocols exist, surveys must be conducted by qualified persons (see minimum criteria for biological monitor, below) using methods recognized and accepted in the professional consulting field. When making presence/absence determinations relative to a project, areas where indirect effects may adversely impact a species must be considered as well. If a habitat is used by a species for some important part of their life cycle, it is considered occupied regardless of whether the species is temporarily absent. Survey protocols or draft protocols have been developed for all federally listed species found on Camp Pendleton.

- Migratory Bird Treaty Act. The MBTA and implementing regulations and orders generally protect migratory birds. On Camp Pendleton, all birds but four are covered under the MBTA. Planners must review proposed actions with regard to conduct of actions during the active breeding seasons (can be January through September) and project caused loss of traditionally used nesting/roosting sites. Habitat clearing activities should be timed to avoid breeding seasons to the maximum extent practicable to avoid damage to active bird nests. Compensation for the loss of traditionally used nesting/roosting sites may be an issue for raptors and colonial nesters, such as herons. All contracts and work orders prepared for Camp Pendleton must include provisions in an Environmental Protection section that prohibit harming, damage, or destruction of active bird nests while requiring "work arounds" without incurring additional cost. The Natural Resource Department (AC/S ES) can provide contractual language for construction contracts.

- Biological Monitor. An on-site biological monitor is typically required for all proposed actions that require active avoidance, are expected to affect threatened or endangered species or wetlands (including vernal pools), or require active revegetation or habitat compensation. The role of the biological monitor is to educate workers regarding applicable natural resource related issues, oversee and implement impact avoidance and minimization, document impacts, and/or guide revegetation

efforts. At a minimum, this individual must have: (1) a bachelor's degree with an emphasis in ecology, natural resource management, or related science; (2) demonstrated local experience with the resource(s) involved; and (3) a good understanding of the regulations regarding wetlands and endangered species.

- Mitigation Costs. The cost of mitigating impacts to natural resources should be considered when evaluating proposed action alternative locations and planning for funding. Mitigation must be treated as part of the project that will be fully funded by the action proponent. Some environmental authorizations and permitting require mitigation funding to be secured and assured prior to causing adverse affects. Resource mitigation costs can be highly variable depending on the specific details of the project (e.g., extent of habitat impacts, type of habitat impacted, duration of impacts, habitat compensation site conditions, and technologies). Provisions of actual cost estimates for mitigation on a "per acre impacted" basis are too variable and project specific to be presented here. Technical natural resource specialists should be contacted during project planning to assist with estimating the likely mitigation costs associated with a proposed action. Cost considerations for impact prevention during action implementation need to be accounted for, as well as habitat restoration and/or compensation (e.g., biological monitoring, placing protective signs/fencing, sedimentation controls, etc.).

- Mission and Management Compatibility. Beyond the financial costs of mitigation actions, the effects on future land use must also be considered. These "costs" can seriously affect the future flexibility of military mission accomplishment. Mitigation actions that involve habitat compensation or enhancement on Camp Pendleton must be planned to support or be compatible with training requirements, long term natural resource management programs, and the Base Master Plan where possible. Site evaluations and approvals for habitat compensation and enhancement must be initiated concurrently with proposed action planning whenever possible. The ideal situation would be for the actual habitat work to start concurrently or before the action causing an impact. The Base may seek opportunities to mitigate at off-Base locations to contribute to the regional recovery efforts for the species and to maintain mission flexibility on Base. Off-Base mitigation sites should be selected in cooperation with regional planning and conservation agencies and approved by the Service. Agreements with the USFWS made in advance of proposed actions may provide flexibility in mitigation requirements and post-mitigation land use restrictions. Such agreements may include mitigation banking (see below), a return to pre-mitigation training restrictions following successful mitigation, mitigation initiatives that do not directly involve habitat restoration/enhancement, and off-Base mitigation.

- Mitigation Plan. All actions that require active habitat restoration, enhancement, and/or compensation must have an appropriate plan developed prior to implementation. Such plans must discuss the site conditions, methods to be implemented, monitoring and maintenance (usually 3 to 5 years), success criteria, remedial actions if expected success is not being achieved, and reporting requirements. The plans must ensure that all applicable requirements of regulatory

approvals are incorporated. Review and approval of plans must be accomplished through the AC/S Environmental Security. In addition, regulatory agencies often require that they have an opportunity to review and approve plans where their authorization is needed for resource impacts.

To facilitate mission requirements and reduce costs, long-term mitigation planning at Camp Pendleton will focus on the development of mitigation banks and conservation agreements. Mitigation banking is defined as "actions taken to compensate for future adverse effects of undertakings by providing resources or environments in advance of any specific undertaking" (U.S. DoD 1996). The primary objective of mitigation banking is to receive credit for habitat improvement or conservation towards mitigation for future projects. Mitigation banking typically reduces the mitigation ratios required for planned actions.

In recent years, many large-scale mitigation land banks have been established in California. With twenty mitigation banks in operation or being established, San Diego County has more mitigation banks than in all other counties of the southern California region (i.e., San Luis Obispo, Kern, and San Bernardino Counties south to the international boundary). Examples of mitigation banks in San Diego County include O'Neal Canyon, Rancho San Diego, Ramona, and Upham. These last two focus on vernal pools. The size of the banks ranges from 25 to 1,840 acres. Given the expanding requirements for training and existing constraints to land use, first consideration would be given to establishing mitigation banks off of Camp Pendleton as an option for meeting natural resource mitigation requirements. The possibility of contributing funds to a third party towards purchase of preserve lands within the MSCP study area will be explored in revisions to this INRMP.

A conservation agreement is a formal document agreed to by the USFWS and other cooperators that identifies specific actions and responsibilities for which each party agrees to be accountable. The objective of a conservation agreement is usually to reduce threats to a candidate or proposed species or its habitat, possibly lowering the listing priority or eliminating the need to list the species. Conservation agreements are usually less restrictive than mitigation banks and do not require transfer of ownership. When appropriate, Camp Pendleton will consider the option of a conservation agreement. MCAS Yuma has recently (6 June 1997) entered a conservation agreement to help conserve the flat-tailed horned lizards (*Phrynosoma mcallii*) on the Barry M. Goldwater Range in Arizona. This species was proposed for federal listing as threatened but the proposal was withdrawn as a result of the signing of the conservation agreement.

If mitigation banking and/or conservation agreements are considered, early involvement of USFWS and other agencies is essential. Such agreements include mechanisms by which future Section 7 consultations and accompanying Biological Opinions will direct mitigation requirements. For example, terms and conditions of future Biological Opinions that involve the set-aside or special management of habitat would draw on a mitigation bank or conservation agreement. This would allow comprehensive long-term mitigation planning, rather than project specific or activity specific mitigation.

OBJECTIVE: Provide project and mission support through the planning, implementation, and integration of mitigation and compensation measures.

Priority Planned Actions:

- Ensure that all direct or indirect permanent impacts to federally listed species are mitigated in accordance with USFWS determined measures and ratios. Ongoing.

- Monitor mitigation sites as determined in the agreement with the regulatory agency following enhancement/restoration efforts to ensure compliance. Ongoing.

- Ensure mitigation projects support or compliment the Base's training area development plan, master plan and goals and objectives for natural resource management. Ongoing.

- Conduct habitat restoration/rehabilitation (including exotics control) for the mitigation of existing projects in accordance with the Riparian Ecosystem Conservation Plan, the Estuarine/Beach Conservation Plan, and the Listed Upland Species Management Program. Ongoing.

- Identify areas both on and off Base that may be used as mitigation sites for future projects. Ongoing.

- Develop mitigation "banks" in anticipation of future project needs. Ongoing.

- Clearly identify the project proponents/offices/positions accountable for project implementation and mitigation requirements for each new project. Ongoing. [Also applies to Section 4.12.1, first and second objectives.]

- Develop an off-Base mitigation bank for future Air Station project needs. 2002.

- Develop a system for tracking mitigation conducted for banking credits and for specific projects. 2002.

- Evaluate the feasibility and desirability to negotiate with regulating agencies reduced mitigation costs for development projects within predetermined cantonment buffers. 2002.

- Evaluate the effectiveness of mitigations applied to various projects in avoiding significant environmental impact, and readjust if necessary. Document the Base's experience and successes to convincingly demonstrate mitigations will reduce impacts to less-than-significant. 2004. [Also applies to Section 4.12.4.]

Other Planned Actions:

- Identify candidate sites for future wetland mitigation to compensate for unavoidable wetland value losses (and include in future master planning documents). [Also applies to Section 4.3.1, first objective.] ***

- Complete the second phase of E-Trax development, testing, and implementation. [Also applies to Section 4.12.1, second objective.] ***

4.12.4 Post NEPA Follow up

Upon receipt of permits, biological opinions, and other consultation documents, it is the Base's responsibility to ensure that the terms and conditions, mitigation, and other nondiscretionary requirements are implemented. The AC/S Environmental Security serves as the lead organization for conducting post NEPA follow up except for actions with no regulatory consultations that take place entirely on MCAS. The aforementioned E-Trax and Mitigation Database are expected to facilitate post NEPA follow up.

OBJECTIVE: Monitor to ensure mitigation compliance for projects implemented or actions taken as set forth in existing NEPA decision documents, Biological Opinions, 404/401 permits, and Coastal Commission determinations.

Priority Planned Actions:

- Ensure the execution of commitments and terms and conditions within consultation documents issued to the Base for DoD and non-DoD agency proposed actions. Ongoing.

- Develop and maintain a comprehensive list of commitments and terms and conditions contained within the numerous formal and informal consultation documents and permits issued to or that apply on the Base. 2002.

- Evaluate the effectiveness of mitigation applied to various projects in avoiding significant environmental impact, and readjust if necessary. Document the Base's experience and successes to convincingly demonstrate mitigations will reduce impacts to less-than-significant levels. 2004. [Also applies to Section 4.12.3.]

4.12.5 Long Range and Master Planning

Long range environmental planning is key to successful natural resource management, integration, compliance, and mission support at Camp Pendleton. Long range planning helps to ensure that Base activities are consistent with natural resource management goals and

objectives, and that those goals and objectives are consistent with the military mission. Long range planning helps to ensure the integration of, and consistency among, planned actions.

The INRMP itself is an important long range planning document for developing environmental baseline information to support activity and operational planning, formalizing natural resource goals and objectives, establishing planned actions to help meet those goals and objectives, and integrating actions and responsibilities basewide. The INRMP review and revision process (Chapter 1) is as important as the document itself, providing a venue for self-evaluation, communication, adaptive management, and further refinement of long range planning and integration.

It is important that the INRMP be fully integrated with other planning documents on Base, especially the Base and Air Station Master Plans. The installation master planners, who are usually within public works, should be very familiar with the INRMP because they designate land use. Master plans typically extend to a 20- to 30-year period, whereas the INRMP provides a planning period of five years. The INRMP may identify designated sensitive areas with land use restrictions. It is imperative that natural resource managers coordinate such restricted areas with the master planners so that, at a minimum, they can be incorporated into the master planners' maps and GIS. Currently, the MCB and MCAS Master Plans primarily focus on the development of facilities and are in the process of being up-dated and integrated with other long term planning documents on Base (including those for training, fire management, and natural resource management). The INRMP is expected to complement and be fully compatible with Master Plans and support strategic planning.

OBJECTIVE: Maintain the integration and relevance of long range planning documents to support the long term sustainability of Base resources and the military mission.

Priority Planned Actions:

- Conduct semiannual INRMP review meetings. Ongoing.
- Integrate natural resources management objectives with mission activities and facilities development. Ongoing.
- Attend Base planning meetings, the Range Working Group meetings, and other meetings to maintain currency with long range Base planning topics and land user requirements. Ongoing.
- Develop and implement an Adaptive Management Plan for MCAS. 2002. [Also applies to Section 4.1.1, second objective.]
- Complete a programmatic Environmental Assessment for the MCAS master plan. 2003.
- Revise the INRMP every 5 years. 2006.

Other Planned Actions:

- Integrate the INRMP into the Base and MCAS Master Plans. ***
- Ensure the INRMP is integrated as appropriate into other Base planning documents. ***

4.13 EMERGENCY RESPONSE

Emergency situations are defined to include acts of God, disasters, casualties, and national defense or security emergencies. Although the timing and extent of such emergencies may not be entirely predictable, it is always possible that such events may occur. In addition to prevention and early detection measures that help reduce the probability of an event occurring or the extent of the damage should an emergency situation arise, the Base recognizes the importance of advance preparation to the fullest extent possible/feasible for handling emergency situations. It is understood that the nature of emergency situations does not always permit avoidance and minimization of impacts to sensitive resources and the environment; however, advance preparation is expected to facilitate avoidance and minimization of impacts where possible and to prevent the exacerbation of adverse environmental impacts during responses to emergency situations.

With respect to potential federally listed threatened and endangered species take incidents incurred by necessary response actions to such emergency situations, 50 CFR 402.05 allows for after-the-fact review of impacts under such circumstances.

GOAL: Develop and implement an Emergency Response Action Plan to avoid and minimize adverse impacts to environmentally sensitive areas and other natural resources.

OBJECTIVE: Develop and implement an Emergency Response Action Plan to avoid and minimize adverse impacts to environmentally sensitive areas and other natural resources.

Priority Planned Actions:

- Provide natural and cultural resource technical services to the Camp Pendleton Fire Department to support their fire management planning efforts and hazardous incident plans. Ongoing. [Also applies to Sections 4.11.1; 4.11.2.]
- Maintain a contract with San Diego County Hazardous Incident Response Team or a similar organization to provide hazardous substance identification and incident technical advice. Ongoing.

Other Planned Action:

- To the extent feasible and consistent with the military mission, ensure integration of natural resources concerns with the Base's emergency mobilization/deployment plans to minimize unnecessary impacts during such emergency situations. **

4.14 INFORMATION MANAGEMENT

Information management (the collection, analysis, storage, maintenance, presentation, and distribution of data) is fundamental to the integration and implementation of natural resource management and the ability to make informed decisions. Comprehensive, well maintained, and accessible GIS based data enable managers, planners, military trainers, and other users of Camp Pendleton to avoid potential land use conflicts through the spatial representation, analysis, and modeling of activities, planned actions, and sensitive resource management.

Types of data required to support management include those collected in Section 4.2 (Natural Resources Inventory) of this chapter (e.g., vegetation types and distributions, plant and animal population sizes and distributions, fire frequency and distribution, floodplain and watershed boundaries, long term trend monitoring, etc.) as well as topographic, soil, land use (roads, buildings, ranges and training area designations, agricultural and park leases, etc.), and other physical features and administrative boundaries. Although not all natural resource data is linked geospatially to locations on the Base, many management decisions, including effectiveness of management plans and adaptive management decisions, require an understanding of the temporal and spatial relationships (e.g., proximity, fragmentation, distribution, etc.) within and among the data. As many of the training areas and locations of sensitive resources are not demarcated in the field, GIS based maps are currently the primary tool for implementing programmatic instructions and for integrating land use and natural resource management in general. This geospacial technology has also provided Camp Pendleton with the potential for facilitated, and increased accuracy in, communication of changes in land use and natural resources information. In addition to increased efficiency in daily operations, well maintained and accessible GIS based data also improves the likelihood of success for long term, master planning.

Several organizations on Base are GIS capable; however, only a few organizations generate the data for end users and serve as the primary administrators of GIS based information. Organizations that generate and manage GIS data on Camp Pendleton include the Public Works Office (AC/S Facilities), Range Operations Division (AC/S O&T), the Information Systems (IS) Branch (AC/S ES), and the Environmental Department at MCAS (see Appendix H for brief descriptions of the role and functions of each organization). It is the IS Branch's policy to create, update, maintain, manage, and analyze all GIS data layers to ensure that this information is available to biologists, planners, and contractors quickly and readily in digital or hard copy format.

Natural resource information management is complex because ecosystems and spatial data are complex and the data necessary to develop composite pictures are inherently cross

disciplinary. Ultimately, the utility and efficacy of GIS based planning and analysis for natural resource management, integration, and implementation requires skilled and knowledgeable system administrators; assurances of the quality and integrity of the data; and adequate accessibility to the necessary technology by Base users, managers, and planners.

GOAL: Provide current, integrated, and accessible natural resource information to on Base and off Base data consumers for comprehensive and effective natural resource management and integration.

4.14.1 System Administrator/User Community

The value and efficacy of information management and GIS data is dependent upon both the knowledge and responsiveness of systems administrators to users' needs and the knowledge and capabilities of the system users. State-of-the-Art technology is of little value if no one uses it.

First equipped with GIS capabilities in 1994, the Base has since been expanding and refining the application of this tool basewide. In 1997, efforts were begun to incorporate GIS technology within all areas of the Base's environmental and natural resource program. In 1997/1998, a comprehensive GIS/IS User Needs Assessment was completed identifying program requirements for GIS. The assessment identified over 100 potential applications of GIS technology within the Base's environmental program. In addition, the assessment provided an analysis of the data requirements of the entire program in accordance with the existing Spatial Data Standards (SDSs) for Facilities, Infrastructure, and Environment (SDSFIE).

OBJECTIVE: Establish/promote a community of managers/users to project the far-reaching vision for geographic information systems development.

Priority Planned Actions:

- Participate in regional GIS working groups. Ongoing.
- Establish an executive level working group ("Geographic Information System Policy Group") with participants from all Base organizations to promote the forward vision and information sharing. 2002.
- Establish a technical level working group ("Geographic Information System Technical Working Group") with participants from all organizations to promote information sharing and resolution of common technical issues. 2002.
- Build the understanding and utility of the GIS to Base land use decision makers by developing a demonstration of its successful implementation, such as conducting

some what-if scenarios for presentation. 2002. [Also applies to Section 4.14.1, second objective.]

OBJECTIVE: Continuously educate managers and users on organizational and technical aspects of GIS.

Priority Planned Actions:

- Provide continuing education in advanced GIS technologies through outside industry sources and/or workshops and conferences. Ongoing.
- Provide training on system software and capabilities to end users. Ongoing.
- Develop GIS education programs for upper level managers and command staff, for technical "power" users, and for basic "casual" users. 2002.
- Create a demonstration of data resolution limitations for a range of environmental applications, and the hazards of using multiple map scales. 2002. [Also applies to Section 4.14.2, third objective.]
- Build the understanding and utility of the GIS to Base land use decision makers by developing a demonstration of its successful implementation, such as conducting some what-if scenarios for presentation. 2002. [Also applies to Section 4.14.1, first objective.]

4.14.2 Data Integrity and Technology Advancements

Equally important as the knowledge and capabilities of system administrators and users are the integrity of the data and the capabilities of the interfacing technology. The utility of data depends upon the quality and quantity of the information generated as well as the format (e.g., application of universal standards) within which the data is stored.

The U.S. Army Corps of Engineer's Computer-Aided Design and Drafting (CADD)/Geographic Information System Technology Center for Facilities, Infrastructure, and Environment has been assigned to develop SDSs for Facilities, Infrastructure, and Environment. The SDSFIE has focused on the development of graphic and nongraphic standards for GIS implementations at Air Force, Army, Navy, and Marine Corps installations, the U.S. Army Corps of Engineers Civil Works activities, and other government organizations.

The SDSFIE provide a standardized grouping of geographically referenced (i.e., geospatial) features or objects (i.e., real-world) depicted graphically on a map at their real-world location (i.e., coordinates). Each geospatial feature has an "attached" attribute table containing pertinent data about the geospatial feature.

The SDSFIE is the only "nonproprietary" GIS standard designed for use with the predominant commercially available off-the-shelf GIS and CADD (e.g., Environmental Systems Research Institute ArcInfo and ArcView; Intergraph MGE and GeoMedia; AutoDesk AutoCAD, Map and World; and Bentley MicroStation and GeoGraphics), and relational database software (e.g., Oracle and Microsoft Access). This nonproprietary design, in conjunction with its universal coverage, has propelled the SDS into the standard for GIS implementations throughout the DoD, as well as the de facto standard for GIS implementations in other federal, state, and local government organizations; public utilities; and private industry throughout the U.S. and the world.

The SDSFIE (along with the Facility Management Standards for Facilities, Infrastructure, and Environment [FMSFIE]) is distributed via CD-ROM and the Internet (*http://tsc.wes.army.mil*). A user friendly interactive Microsoft Windows-based software application installs the SDSFIE/FMSFIE "Browser" and "Generator" applications on desktop computers and networks. The "Browser" application provides viewing and printing capability. The "Generator" application generates Structured Query Language code for construction of the GIS database.

The CADD/GIS Technology Center annually updates and expands the SDSFIE. Prior to July 1999, the SDSFIE was known as the Tri-Service Spatial Data Standards and the FMSFIE was known as the Tri-Service Facility Management Standards. The SDS/FMS Release 1.90 and 1.95 were completed in December 1999 and April 2000, respectively. The SDSFIE/FMSFIE Release 2.00 was completed in January 2001.

OBJECTIVE: Establish/maintain Camp Pendleton's GIS natural resources coverages and databases, ensuring all information is current and meets geoinfo standards and quality controls.

Priority Planned Actions:

- Continue to develop precise and reliable natural resources datasets. Ongoing.

- Semiannually review GIS data to advise resource managers of needs to update datasets during budget planning and programming and in preparation of publishing the semiannual Environmental Operations Map. Ongoing.

- Ensure that standards for GIS database dictionaries and associated metadata for all Camp Pendleton GIS coverages are met. Ongoing.

- Ensure that all contracts with the potential for producing spatial data will include specific language with respect to the production of spatial data that are fully compatible with Camp Pendleton's GIS database. Ongoing.

- Ensure that the information system support staff responsible for operating and maintaining the system annually obtain focused training regarding current technologies and uses of GIS technology as related to natural and cultural resource management on a military installation. Ongoing.

- Ensure all reports, maps, and data received from contractors and supporting studies and surveys are received in digital versions for addition to GIS and the Document Management System. Ongoing. [Also applies to Section 4.14.3.]

- Evaluate the quality, accuracy, and resolution of mapped environmental data for all coverages. Ongoing.

- Identify, in specific terms, the appropriate use of each data layer based on the quality and resolution of the data source, and whether it is current. Ongoing.

- Require field verification of all data for site specific projects; including soil testing, on-site inventories for sensitive species, etc. Ongoing.

- Every six months, update the Base's Environmental Operations Maps to include the most current species and natural resource data. Ongoing. [Also applies to Section 4.5.1.]

- Establish a database design for each federally listed species, and selected other species as appropriate, to ensure that survey data and summary statistics are comparable from year to year and fulfill requirements for Biological Opinion terms and conditions. 2002.

- Update GIS data layers for natural and cultural resources from various internal and external reports and NEPA documents written for the Base. Clear backlog by 2004.

Other Planned Action

- Digitize, with high-resolution scanning, the historical and ongoing aerial photos of the Base and provide archival storage protection for the original prints. 2002. [Also applies to Section 4.2.3.] **

OBJECTIVE: Maintain operational GPS capability for use with Camp Pendleton's GIS to quickly and accurately map natural resources to provide to biologists, planners, and contractors in an efficient manner.

Priority Planned Actions:

- Ensure all GPS hardware, software, and maintenance agreements are current. Also, ensure these are technologically advanced and capable of withstanding extreme mapping conditions. Ongoing. [Also applies to 4.14.2, third objective.]

- Ensure that all GIS computer hardware, software, peripherals, and maintenance agreements are current. Also ensure that hardware and software are capable of complex computations and manipulations with large data sets, detailed graphics are viewable, and that quality maps and reports can be produced. Ongoing. [Also applies to 4.14.2, third objective.]

- Develop a Standard Operating Procedure for using the GPS unit in the field and for data translation with a software interface that is user friendly for Natural Resources Department personnel. 2002.

OBJECTIVE: Develop new information and products that increase the efficiencies of the planners and managers. Ensure the technically sound, practical, and appropriate use of storage and computer technology to manage, analyze, and communicate natural resource information in support of management decisions.

Priority Planned Actions:

- Seek out and use existing technology and make strategic investments in new technologies and creative, innovative management techniques to address local, regional, or global environmental problems. Ongoing.

- Facilitate better natural resource decisions on Camp Pendleton by improving the capability to access, organize, analyze, and reproduce maps, inventories, remotely sensed data, and other natural resource planning documents. Ongoing.

- Ensure all GPS hardware, software, and maintenance agreements are current. Also, ensure these are technologically advanced and capable of withstanding extreme mapping conditions. Ongoing. [Also applies to Section 4.14.2, second objective.]

- Ensure that all GIS computer hardware, software, peripherals, and maintenance agreements are current. Also ensure that hardware and software are capable of complex computations and manipulations with large data sets, detailed graphics are viewable, and that quality maps and reports can be produced. Ongoing. [Also applies to Section 4.14.2, second objective.]

- Anticipate the need for and seek compatibility with other Base systems, so that land use decisions are coordinated to the greatest extent possible. Ongoing.

- Create a demonstration of data resolution limitations for a range of environmental applications, and the hazards of using multiple map scales. 2002. [Also applies to Section 4.14.1, second objective.]

Other Planned Action:

- Acquire any commercially available GIS products that would enhance Camp Pendleton's GIS database. **

4.14.3 Information Integration: Storage, Access, and Dissemination

Data developed through fieldwork, surveys, and inventories as part of all AC/S ES managed contracts, cooperative agreements, and project specific surveys are incorporated within GIS layers and databases, which allows selection of specific information to be displayed for general basewide, project specific, or training applications.

Natural resource data is made available to the Base community through the publication of three primary maps: the Base Special Training Map, the Natural Resource Map, and the Environmental Operations Map. These maps provide training units and organizations on Base with information regarding the locations and distributions of sensitive species and habitats on the Camp Pendleton. For each environmentally sensitive area depicted on the maps, constraints, restrictions, and guidance are identified.

The Base Special Training Map, published by the Defense Mapping Agency, illustrates general land use and environmental and natural resources on Camp Pendleton at a scale of 1:32,500 (1 inch represents 32,500 feet). While this map is useful as a general reference, it is only revised every few years (the most current version, was revised in October 1997) and the geospatial representation of data is not highly accurate for localized planning. To provide more up-to-date natural resource and land use information for general Base distribution, the AC/S ES IS Branch publishes a Natural Resource Map and an Environmental Operations Map. Revised more frequently than the Base Special Training Map, the Natural Resources Map is printed at a similar scale and is for general planning purposes only. Alternatively, the Environmental Constraints Map is published semiannually, at a larger scale for use in the field (approximately 1:24,000), and in a black and white format for mass copying and distribution. The Environmental Operations Map is the primary natural resource reference map for Range Control, military trainers, Fire Department personnel, and Base managers and planners.

In 1998, efforts continued towards implementation of a shared basewide GIS program. As a cooperative effort, the Base Policy and Technical Workgroups have continued working to establish a framework for the organized, sustainable implementation of GIS technology throughout the Base. Current efforts include establishment of metadata standards in accordance with Executive Order 12906, network connectivity between data partners, and the setting of geospatial data standards.

IS Branch of AC/S ES is in the process of developing an intranet web site to increase access to environmental compliance and natural resources related information. This web site will be used to disseminate environmental guidance, policy, natural resource data, GIS maps, and other information to Base managers and land users.

For non-GIS based data, the ES office is currently developing the organizational capacity and policy for the coordinated management of this resource. Tabular data and text information have historically been managed at the individual AC/S ES staff member or branch level through the use of desktop databases and other software programs. The lack of coordination and an absence of formal ES policy concerning the management of this information have resulted in less than optimal teamwork among branches, decreased efficiencies, a loss of corporate knowledge, and poor project turnover for new or reassigned employees.

One of the projects that Environmental Security has undertaken to improve the storage, maintenance, and accessibility of natural resource management information is the development of a Technical Integrated Information Center (TIIC). This state-of-the-art center is designed to provide virtual library resources for the archiving and retrieval of ES data and documents. The TIIC is still in development stages. One objective of the TIIC program is to provide automated management of all Camp Pendleton environmental documentation for compliance with NEPA and MCO P5090.2A, including Environmental Assessments, Categorical Exclusions, and Environmental Impact Statements.

OBJECTIVE: Establish/maintain a repository of Camp Pendleton's environmental knowledge base and provide accessibility to data and information for biologists, planners, contractors, and others in a quick and timely manner.

Priority Planned Actions:

- Continue development and maintenance of the Technical Integrated Information Center. Ongoing.

- Ensure all reports, maps and data received from contractors and supporting studies and surveys are received in digital versions for addition to GIS and the Document Management System. Ongoing. [Also applies to Section 4.14.2, first objective.]

- Maintain hard and soft copy records of reports, studies, reference materials, and periodicals for environmental inventory. Ongoing.

- Develop (2002) and maintain a natural resources intranet website for access to natural resource data catalog by Base organizations. Ongoing.

- Facilitate distribution of updated Environmental Operations Maps to Base users. Ongoing. [Also applies to Section 4.5.1.]

- Develop a Standard Operating Procedure for the release of GIS data and survey/monitoring results. 2002.